THE PHILIPPINE
JOURNAL OF SCIENCE

VOL. 25 DECEMBER, 1924 NO. 6

COMPLAINTS OF PATIENTS UNDER ANTILEPROSY TREATMENT, I

NATURE AND FREQUENCY IN CASES RECEIVING CHAULMOOGRA ETHYL ESTER PREPARATIONS [1]

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[1] This paper is based on work done by the treatment staff while the senior author was serving temporarily as acting chief physician and, as such, chairman of the staff committee controlling the treatment work, and while the present chief physician was supervising physician of Clinic II. The material used is from reports from the clinic records of Drs. J. M. Alonso, G. Fernandez, G. Limkako, E. Roxas-Pineda, J. Samson, F. Tuason, F. Velasco, and B. de Vera, to whom due acknowledgment is hereby made. Published with the consent of the Director of Health and the approval of the Philippine Leprosy Research Board.

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GENERAL INTRODUCTION

In all considerations of a disease and its treatment there are many apparently minor features that, individually or in summation, are of importance for the definition of the problems that are presented. In the present state of knowledge of most diseases it is no longer acceptable to deal loosely with their major features, the landmarks, as it were; precise knowledge of their minor elements is required, and these have been or are being studied intensively and exhaustively. In leprosy, unfortunately, comparatively few studies of this sort have been made. Though the problem is large and difficult, and has long been studied, many major features are not yet well defined. The workers are comparatively few, and often they are so handicapped in the way of time, equipment, and material that comparatively little opportunity is had for really intensive work. Therefore, much of the literature, which is not accumulating with any great rapidity, necessarily does not deal with the subject in the light of precise knowledge. This is our reason, and apology if such be necessary, for presenting in considerable detail data much of which may seem—and indeed very likely is—of decidedly minor importance.

In the course of the work of the treatment staff of the Culion Leper Colony it was found desirable to establish definitely the relative values of certain preparations of the chaulmoogra ethyl esters used as the basic medication. For this it was preferred not to depend upon a determination of the apparent effects in the matter of improvement in patients after a sufficient period of trial, but also to study the more immediate side-effects, as these are often important, particularly in certain classes of cases.

It seems now to be recognized by leprologists that distinction must be made between two main types of patient groups. One is composed chiefly of early cases, with respect either to duration or to advancement. Such are more frequently met with in institutions of first segregation like the Kalihi Leper Hospital in Honolulu and the San Lazaro Hospital in Manila, both of which are primarily collecting stations, though antileprosy treatment is given to all cases admitted to them. The other group is composed of cases of the later degrees of duration and advancement, which greatly predominate in the more usual leprosarium.

In actual treatment work these two groups present distinctly different problems. Practical experience indicates that the more recent cases can, as a rule, be given more-intensive treatment with less apparent injury from the treatment itself and, certainly, with much better ultimate effect on the disease. For this reason it cannot be expected that the results of treatment in the general leprosarium will be directly comparable with those obtained in the segregation asylum. It is necessary in such institutions, if experience in this colony is any criterion, to place much importance on the conditions that tend to limit the intensiveness of treatment, which makes it essential to use a preparation that produces as few of these as possible.

Reports on the more modern leprosy treatments do not always discuss the various side-effects seen in cases under treatment, and none of which we have knowledge deals with them in detail. Since most leprosaria are, at least in effect, institutions of final segregation, with a majority of cases in which these side-effects are important, it is deemed desirable to publish in some detail data on certain observations made here.

DATA PRESENTED

The necessity of individualizing cases under treatment is generally recognized. It is not sufficient for an efficient treatment campaign to install a group of semitrained injectors, such as

nurses, under the supervision of a comparatively few physicians. It was this consideration that led the Philippine Health Service, when in 1922 it was decided to extend modern treatment to the great bulk of the five thousand and more inmates of this colony, to install a medical and nursing staff that to some seemed unnecessarily large and expensive, though actually it was still inadequate, since it was necessary to assign about four hundred fifty cases to each treating physician. In spite of the considerable amount of clerical work involved, ever since the work was begun on a small scale in 1921 the treating physicians have been expected regularly to record, besides the treatments given, the incidents and complaints reported by or observed in the patients treated. These records are, obviously, of value in determining the immediate and incidental effects of the various preparations used, and furnish the material on which the present series of reports is based.

Previous to April, 1923, all but a relatively few of the cases under treatment were receiving either plain chaulmoogra ethyl esters or a preparation containing 2 per cent iodine. The impression having become current that the iodine itself was responsible for some of the side-effects seen, the staff committee deemed it desirable to determine whether a 0.5 per cent iodized preparation would be preferable. Eight of the treating physicians were thereupon requested to divide their groups receiving the iodized drug into two approximately equal subgroups, for comparison of these two preparations. They were informed that reports would be required on the side-effects observed in these groups, and somewhat over two months later detailed reports were obtained for the period from April 15 to June 15; for comparison similar reports were obtained on the plain-drug groups for the same period. In the present paper the data are examined from a general viewpoint; the comparisons of the three preparations will be made in a second paper. A third paper is based on a similar comparison of creosoted and noncreosoted ethyl esters, made later in the year. A fourth paper is contemplated on the chaulmoogra-olive-camphor mixture known in the Philippines as the Mercado formula, which was developed under Heiser's administration as Director of Health and was popularized by him; it has been found desirable to compare the effects of this preparation, as now made with comparatively nonirritating chaulmoogra oil, with those of the ethyl esters.

The staff was not forewarned that a report would be made on the group receiving the plain ethyl esters and this may lessen the accuracy of the comparison, for it is possible that some of the physicians may have paid more attention to recording the incidents of the cases known to be under special observation. On the other hand, this would have made no difference with conscientious workers; further, the fact that special attention was being paid this matter in certain groups may have stimulated attention to it in the others.

Most conditions actually demanding the attention of the physicians, either directly or through complaints of the patients—as, for example, choking, severe local inflammation, and lepra reactions—were undoubtedly recorded, whatever drug was used. For the other incidents the physicians must depend largely on the testimony of the patients at the time of their next visit, usually at least one week later and oftentimes, due to failure of patients to report to the clinic, after two weeks or more. The more unpleasant occurrences are, on the whole, regularly reported by the patients, who regard them with some degree of apprehension and report them so as to be excused from the next injection. They usually are excused, for it is deemed not justifiable to require patients to take the injections unwillingly. Of course, this leads to another source of error, for some undoubtedly report fictitious complaints; but it is felt that, in the main, they desire to be treated and that when they object to injections they usually have cause to do so.

From a careful consideration of the data we are inclined to believe that these possible sources of error have not caused any essential inaccuracy, and that, while the figures obtained for some of the items are undoubtedly too low, most of the total figures afford valid information at least regarding the relative frequency of the various incidents. They are undoubtedly much more accurate for comparison of the different preparations in this respect, as the personal equation of any individual physician may be expected to affect the records of all of his patients similarly.

NUMBER OF CASES TREATED AND COMPLAINING

The total numbers of cases treated in the groups under consideration, their distribution in the two clinics, and the numbers and percentages of these for whom one or more complaints were registered during the two months involved, are given in Table 1. It is to be noticed that here, as in most tables in

this report, percentages are reduced to the nearest whole number when they are 10 or over. This facilitates comparisons and is considered preferable in such studies as this where mathematical accuracy in the work on which the data are based is not attained. Because of this practice the totals frequently show an error of one.

TABLE 1.—*Numbers and distribution in clinics of patients treated and complaining.*

Clinic unit.	Cases treated.		Cases complaining.	
	Number.	*Per cent.*	*Number.*	*Per cent.*
I, 1	392	13.9	268	68
I, 2	360	12.8	226	63
I, 3	375	13.3	200	53
I, 4	382	13.6	260	68
Total, Clinic I	1,509	53.6	954	63
II, 1	291	10.3	248	85
II, 2	365	12.9	327	90
II, 3	355	12.6	274	77
II, 4	298	10.6	182	61
Total, Clinic II	1,309	46.4	1,031	79
Grand total	2,818	100.0	1,985	70

Numbers treated.—The total number of cases registered in the treatment groups included in this report is 2,818, certainly a sufficiently large number to make a statistical treatment of the data of value. Somewhat more than one-half (53.6 per cent) were registered in Clinic I. The numbers per clinic unit range from 291 to 382 (10.6 to 13.9 per cent of the whole), with an average of 352.

Numbers complaining.—During the two months involved records were made of one or more complaints for each of 1,985 cases, 70.5 per cent of the whole. Clinic I reported much fewer complaining than did Clinic II, 63 per cent as compared with 79 per cent.

CLINIC DIFFERENCES

The differences between the clinics are typical of those seen throughout these analyses. Besides individual variations between units of each clinic, the clinic totals differ widely. Clinic I has almost always decidedly lower figures than Clinic II. This is probably in large part due to differences in the patients treated. Those of Clinic I have on the average been under

treatment longer, a total of 1,525 patients having been registered there at the time Clinic II started, in April, 1922. They include those of the selected group of 500 first treated in July, 1921, that remained under treatment. Clinic II, on the other hand, has few selected cases; the great majority taken on there were advanced, and many had incipient complications which tend to increase the complaint rate. However, there is some evidence that the typical clinic differences do not depend wholly on this factor. In the third paper the same differences will be seen in the groups of recent duration, recently brought to Culion, as in the older cases. Furthermore, as will be seen there, the elimination of several hundred unsuitable cases from Clinic II did not reduce the clinic differences. Therefore, it would seem that, as the personal equation affects the records of the individuals of a clinic group, an analogous "group equation" affects those of the two clinics. For this reason, the clinic figures will frequently be considered separately.

NATURE OF COMPLAINTS

The complaints and incidents registered may be classified, with very few exceptions, into five types, though a sixth should be determined, as will be pointed out.

TYPE 1, IMMEDIATE EFFECTS

Immediate effects are choking and dizziness. These occur during or immediately after the injection, and practically invariably occur in the clinic room. In the first of these reactions the patient is suddenly attacked with a paroxysm of choking with violent coughing. The face becomes markedly flushed, respiration is difficult, and active perspiration often occurs. Dizziness may occur in these paroxysms, but it is overshadowed by the other symptoms. A strong taste of the chaulmoogra oil is often complained of, and the odor may sometimes be noted on the breath. The attack lasts but a few minutes. The patient often complains afterwards of chest pain which lasts for a day or two, seldom for a week, though rarely it may persist for a month or even more.

Dizziness is more frequently observed alone than as an accompaniment of choking. This is usually not alarming and quickly passes off, with no sequela except perhaps headache. More severe attacks are accompanied by dimness or even temporary loss of vision; very rarely localized twitchings or general muscular convulsions have been observed.

Patients often complain seriously of these occurrences, but so far there has been not a single death directly or indirectly attributable to them. The obvious explanation of them is that during injection the needle point is within a venous channel in the muscle mass and that the injection is therefore actually given intravenously. It will be noted that these events were recorded much more frequently by certain of the physicians than by the others. The explanation is not apparent. It is possible that it lies in differences in technic; some may have injected deeply and others superficially, or some may possibly have regularly tested for blood at the needle-tip by traction on the piston and others may not have done so.

It may be remarked that a few patients are said by their physicians—and this is suggested by the figures—to be peculiarly liable to these phenomena. No explanation for this is suggested unless it be that their venous channels are unusually large or relatively numerous.

TYPE 2, LOCAL EFFECTS

Local effects are recorded as induration, abscess, and pain. Some degree of local reaction to the injected material is, undoubtedly, a constant occurrence; it is the degree and persistence of this that is of significance. Troublesome local reactions are important because, if frequently repeated, they tend to discourage the patient, which makes it very desirable to determine the least irritating effective preparation.

The only condition of importance is simple inflammation, with swelling and more or less pain. Ordinarily, the local reaction is moderate and lasts but a few days, and it may not be especially noticed, particularly by patients who have been treated for some time; they may report no trouble, though on inspection more or less residual induration may often be found. The necessity of examining the site of the last injection to determine such an induration, and the fact that the patients line up for injection with the site, usually selected by themselves, prepared for the injection, seems to limit the recording of this condition to instances severe enough to cause the patient voluntarily to complain.

The frequency of troublesome reactions may, to some extent, be determined by the technic of injection. Certainly, if any of the drug is placed subcutaneously there is much more likelihood of trouble than if it is all put deep into the muscle. Though this reaction usually occurs at the site of injection, sometimes

it is found at some distance (10 to 20 centimeters) below, evidently because of gravitation of the drug. Frequently the nearest lymph nodes are found to enlarge, and occasionally troublesome adenitis develops, which in a number of instances has gone on to necrosis and ulceration, very slow in healing.

Abscess formation, a distinctly infrequent event, is an occurrence that is not entirely preventable. The abscesses are usually sterile, due to drug necrosis.[2] On what condition their development depends is not known. Only rarely does a case show a special tendency to this accident.

Pain at the injection site was recorded specially by only two or three physicians, in such small numbers that a separate classification is not justified; they are, therefore, included in the "induration" figures. Exquisite lancinating pain, deep and distinct from that occasioned by the skin puncture, is sometimes complained of during the injection. This is probably the result of injection directly into a nerve. It is very infrequent when the injection is in the arm or the buttock, usually occurring in the forearm or leg, where patients sometimes insist that the injection be given.

TYPE 3, GENERAL SYMPTOMS

Here are grouped headache, malaise, weakness (usually not differentiated from malaise), simple fever, chill or chilliness, insomnia, anorexia, and abdominal pain. The figures for the last have, in the compilations, erroneously been included in Type 5, but the number reported was so small that the results are not affected. Another complaint sometimes made is a peculiar sensation of general heat, but this was not recorded in these reports.

Of this symptom-group it is obviously impossible always to determine in a given instance to what the trouble may be due. In inmates of a leper colony, many of whom have ulcers that may be more or less infected, tuberculosis, or early nephritis superimposed on the basic disease, such occurrences would not be infrequent without treatment. However, there is no doubt in our minds that the treatment increases their frequency, and

[2] The following data on bacteriological examinations of material from abscesses has been furnished by Dr. F. Solis, assistant pathologist in charge of bacteriological routine: Specimens submitted, 1923, 60. Sterile (smears and cultures) 36; acid-fast bacilli (*B. lepræ*) in smears, 3; culturally positive, 21. Organisms isolated: *Staphylococcus aureus*, 18; *Streptococcus* (hæmolytic), 2; Gram negative bacillus, 1.

as they are often reported by patients as reasons for not receiving injections they decidedly affect the treatment work.

TYPE 4, RESPIRATORY TRACT SYMPTOMS

Chest pain and chest oppression, with or without cough, and cough alone, are frequent complaints. They are very important here in as much as a large percentage of the inmates present evidence of latent or active tuberculosis, and the ethyl esters, if injudiciously used, seem clearly to activate this condition. The patients are perhaps more apprehensive of this than of any other side-effect of the treatment, and seem faithfully to report these events when they occur—and, perhaps, sometimes when they do not.

TYPE 5, LEPRA REACTION SYMPTOMS

Lepra fever and cutaneous eruptions without fever are the two principal occurrences in this group recorded by the staff. Other complaints here grouped are neuritis, rheumatic pain, orchitis, and inflammatory reaction of the eye, these usually when occurring in the absence of general lepra reaction symptoms. Arthritic reaction is also occasionally seen, but it was not recorded in these reports. The nature and relationship of these conditions cannot be discussed here; they are being paid particular attention and will probably be reported on separately. Suffice it to say that the minor incidents mentioned, arising abruptly and subsiding more or less slowly, are believed usually to be of the nature of localized "reactions." Eye inflammation is of special interest, as the impression had been gained that the iodized preparation is particularly prone to cause it. It is usually in the form of iritis, and iridocyclitis in severe cases, with intense pain. Rarely is there suppurative inflammation. This complaint may be a part of the manifestation of a general lepra reaction. Ordinarily it lasts from a few days to one or two weeks; a few cases last several months.

Lepra reactions are generally recognized to be of special interest in treatment work. Repeatedly it is seen that after the subsidence of a reaction old lesions tend to improve; consequently, some authors consider it desirable to cause such reactions. As has been said elsewhere [3] it seems from our statistics that on the whole they are not beneficial, though this probably refers to the more severe types. Whether the ideal

[3] Wade, H. W., Journ. Phil. Is. Med. Assoc. 3 (1923) 236–241.

drug should produce few reactions, or frequent mild ones, we believe is yet to be established.

TYPE 6 (PROPOSED), NEPHRITIS

This condition and the symptoms arising from it should constitute a sixth group of incidents and side-effects. Obviously, it would be most difficult to separate from group 3 the complaints having kidney disturbance as the underlying cause. Usually when œdema occurs that is differentiable from the swellings common in lepers the patient has to be hospitalized. Since frequent routine urinalyses are not carried out on all cases under treatment, nephritis has no place in the data to be presented. However, it is one of the most important complications of the treatment work here, perhaps not second even to tuberculosis. Though the death rate in this colony has not increased since the treatment work began (it was 9.4 per cent in 1922 and 9.1 per cent in 1923), and though the proportion of deaths from tuberculosis has not increased significantly, if at all, the deaths due to chronic nephritis increased markedly in 1923 over the 1922 figure. A recent survey of over eight hundred unselected cases under treatment revealed a very large proportion with some degree of albumen and with casts. This matter is now being paid particular attention.

FREQUENCY OF COMPLAINTS

In a consideration of frequency of complaints there are two main features; namely, the number of patients of a group who complained, as indicated by percentages, and the number of complaints recorded. For the latter either of two frequency rates is used here. One is based on the total number of patients in the entire group for which the rate is given, the other on the number of patients of that group for whom any complaint was reported. To avoid possible confusion, the former is here referred to as the "total" complaint rate, and is given as per 100 cases treated; this may be of nearly any value, ranging, as in Table 4 for example, from 4.1 to 225. The latter is called the "excess" complaint rate and is so given as to show the average number of complaints recorded in excess of one for each patient complaining; they are therefore usually fractions, as in Table 3, where they range from 0 to 0.67. The latter figure does not indicate that 67 patients per hundred registered two complaints; there may, for example, have been 60 patients complaining, seven of these with three complaints.

TABLE 2.—*Percentages of patients complaining of various symptoms and incidents.*

Symptom or incident.	Clinic I.			Clinic II.			Total average.
	Low unit.	High unit.	Average.	Low unit.	High unit.	Average.	
Choking	2.0	7.2	2.9	2.4	10.4	7.1	4.9
Dizziness	1.3	2.6	2.0	0	2.4	1.0	1.5
Induration	12.8	39.5	20.3	9.9	42.7	22.4	21.3
Headache	2.4	11.1	5.2	2.0	10.1	6.9	6.0
Malaise and weakness	2.0	4.7	3.4	3.0	17.2	9.9	6.4
Fever (simple)	2.8	11.0	7.4	7.3	17.1	11.5	9.3
Chest oppression and chest pain	6.5	12.2	9.9	13.8	32.0	20.7	15.0
Cough (only)	4.4	28.6	15.6	9.4	34.6	23.0	19.1
Cutaneous reaction and lepra fever	13.0	18.9	15.6	11.6	16.0	12.8	14.3
Eye inflammation	1.1	3.6	2.3	2.1	3.3	2.9	2.6
Rheumatic pain	0.8	3.1	1.9	0.3	3.9	1.8	1.8

FREQUENCY OF INDIVIDUAL SYMPTOMS

The frequency of the more important individual complaints will be considered here separately; in subsequent sections they will be grouped by type. In Tables 2 and 3, which are to be correlated, the percentages complaining and the excess rates are given. Besides clinic and total averages, there appear the individual figures for the lowest and highest units of each clinic, the complete details being of interest only to the treating staff. Malaise and weakness, chest oppression and chest pain, and lepra fever and cutaneous eruption are combined because evident irregularities in diagnosis make the separate figures of little value.

In connection with the irregularities of individual figures seen in these tables it may be said that, while the effect on the final totals is considerable in some cases, it is not usually so. It will be noticed that the clinic averages (of four units) are often roughly the average of the extremes given. Further to determine this, eight of the total averages have been compared with selected averages for the same symptoms obtained by arbitrarily eliminating the reports varying most widely from the apparent normal. In six instances the differences between the two figures so compared were not important; in the other two they were about 20 per cent of the original average. There is, then, as in such statistical work generally, a decided tendency for the extremes to neutralize each other.

TABLE 3.—*Excess frequency rates of various symptoms and incidents in patients complaining.*

[Rates in excess of one per person complaining.]

Symptom or incident.	Clinic I.			Clinic II.			Total average.
	Low unit.	High unit.	Average.	Low unit.	High unit.	Average.	
Choking	0	0.17	0.05	0	0.21	0.14	0.11
Dizziness	0	0.30	0.10	0	0.25	0.08	0.09
Induration	0.39	0.90	0.77	0.19	0.74	0.48	0.63
Headache	0	0.05	0.01	0	0.19	0.11	0.06
Malaise and weakness	0	0.27	0.06	0	0.17	0.09	0.08
Fever (simple)	0	0.24	0.12	0.05	0.35	0.16	0.14
Chest oppression and chest pain	0.05	0.16	0.10	0.02	0.56	0.25	0.20
Cough (only)	0	0.15	0.09	0.14	0.65	0.41	0.27
Cutaneous reaction and lepra fever	0.06	0.45	0.15	0.02	0.24	0.12	0.15
Eye inflammation	0	0.63	0.17	0	0	0	0.08
Rheumatic pain	0	0.67	0.07	0	0	0	0.04

Choking.—This occurred in 4.9 per cent of the patients. The percentages and rates of Clinic I are comparatively low, and the variation among the units is not important. In Clinic II, on the other hand, there is wide variation. Since the phenomenon is unmistakable, occurrences of it could not have been overlooked where low figures obtain; as has been said, the difference may perhaps be ascribable to differences of technic. In connection with the statement previously made that a few patients seem particularly liable to this occurrence, it may be remarked that four patients had it three times each in the two months.

Dizziness.—So far as the records show, this is an infrequent occurrence; one unit did not record it at all, though that does not, of course, prove it did not occur there. The suggestion comes to mind that, the average of Clinic I being twice that of Clinic II, the patients there may be less susceptible to respiratory tract irritation and that a goodly proportion of them experienced merely dizziness, whereas in Clinic II most had the more severe reaction.

Induration.—The wide variations here seen are undoubtedly due chiefly to differences in the attention paid this matter. While differences in proportion of patients under the most irritating preparation will affect the figures, as will be seen in the second paper, they are not sufficient to account for the figures. The total average, 21.3 per cent, is undoubtedly low,

though the highest figures are undoubtedly too high if only troublesome indurations are to be considered. The excess rates also vary widely, from 0.90 to as low as 0.19, the latter for a unit which also reported a very low percentage. The fact that the average frequency rate is much higher for Clinic I than for Clinic II must, particularly in view of the dosages given (Table 7), be ascribed to the personal equation, since it is improbable that the patients involved were so much more susceptible to local irritation.

Abscess.—This condition occurred too infrequently to necessitate special consideration. Three physicians did not report it, while the other five had a total of but nine cases.

Headache.—The irregularity of the percentages suggests that in some units little attention was paid to this complaint. The total average, 6 per cent, is low. According to the excess rates, comparatively few cases complained of this twice during the period. Actually, this trouble occurs very commonly within a few hours after injection, but it is ordinarily not complained of.

Malaise and weakness.—These were recorded much less frequently for the cases in Clinic I than for those in Clinic II; here two units recorded them in 14.8 and 17.2 per cent, respectively, though the others give but 3.0 and 4.2 per cent. It is believed that the former figures more accurately represent the true condition in that clinic. It is surprising that the frequency rates are so low, only three units reporting any duplication.

Simple fever.—Here again variations are wide, and the averages are believed to be too low. The greater total percentage for Clinic II is not surprising, but the nearly equal frequency rate is unexpected. It may be said that the highest percentage is reported by a physician, most of whose figures are very low, who some time ago was asked to make special observations on the occurrence of fever after injection. Slight rise of temperature following injection is very common, but it is usually not noticed by the patient; only fever sufficient to be recognized and complained of by the patient would be recorded here as it is quite out of the question to keep temperature records except in hospitalized cases.

Abdominal pain.—This symptom was not frequently reported and figures are not given. Six of the physicians recorded it in a total of but 23 cases.

Chilliness, insomnia, and anorexia.—These were recorded a few times by several physicians, but the number is small.

The first was recorded by five physicians in a total of 12 cases; the others were reported even less frequently.

Chest oppression and chest pain.—The number complaining of these symptoms (with or without cough) is rather high, particularly in Clinic II. Three units in Clinic I reported very uniformly, ranging only from 9.2 to 12.2 per cent; the fourth who, as will be seen, gives the smallest average dosage of all, records but 6.5 per cent, which may perhaps be accounted for on this ground. In Clinic II, two units with 32 and 22.8 per cent, respectively, are much higher than the other two, with but 15.2 and 13.8 per cent, though one of the latter gave comparatively high dosage. The differences between the averages for the two clinics, 9.9 as compared to 20.7 per cent, may be valid. The average frequency rates are nearly alike and are low, perhaps due to lowering of dosage or temporary suspension of treatment in cases complaining.

Cough (alone).—This complaint was naturally reported more frequently than the other chest symptoms, though probably too infrequently because patients are not apt to notice the lesser degrees of this. The average percentages for the clinics, 15.6 and 23 per cent, respectively, differ less than might be expected from the combined chest oppression and pain figures. It is suggested that the patients in Clinic I are on the whole in better condition as regards their chest condition and so have relatively more of the less marked symptom, while those in Clinic II tend to have the other complaints together with cough. In agreement with this is the comparatively high cough rate of this clinic, 0.41 against 0.09.

Hæmoptysis.—This symptom was recorded only by the four physicians of Clinic II, in 6 cases, which fact is in keeping with the other differences between the clinic groups as regards chest symptoms.

Cutaneous reaction and lepra fever.—The combined figures are comparatively very uniform; Clinic I averages the more, with 15.6 to 12.8 per cent. This is the only important symptom-group reported as occurring more frequently in that clinic. If reasonable regularity of recording be assumed, the suggestion arises that the generally more favorable cases of Clinic I are more prone to have this type of reaction. However, that they are so cannot be asserted on the basis of this analysis alone. As for the rates, certain of the comparatively very high ones

must be questioned. It is doubted that many patients had two distinct attacks of these reactions within so short a time.

Other probable "reaction" symptoms.—Eye inflammation occurred in approximately equal percentages in the clinics, totaling 2.6 per cent. Only one physician reported an excess rate; this (0.63) seems doubtful; the same disturbance, lasting more than one week, was probably recorded two or more times. Rheumatoid pain occurs infrequently and, naturally, somewhat irregularly, but the average percentages are practically equal. The same physician who reported a high rate for eye inflammation also reported 0.67 for this complaint, markedly in contrast to the others. Neuritis and orchitis were each recorded by but two physicians, one case each.

FREQUENCY OF SYMPTOMS BY TYPES

To summarize by types the complete data on occurrence of symptoms, not all of which are included in the tables given above, Table 4 has been prepared.

TABLE 4.—*Total frequency rates of complaints, by types and in total.*

[Rates per 100 patients treated.]

Complaints.	Clinic I.			Clinic II.			Total average.
	Lowest.	Highest.	Average.	Lowest.	Highest.	Average.	
Type 1, immediate	4.1	7.1	5.5	4.5	13.8	8.9	7.1
Type 2, local	19	73	36	12	74	33	34
Type 3, general	12	21	17	21	42	32	24
Type 4, respiratory	12	40	26	26	76	58	41
Type 5, reaction	14	34	23	13	25	20	22
Total	85	127	107	95	225	152	128

Of the total number of 3,601 complaints reported, but 45 per cent were reported from Clinic I, in spite of its greater registration in the groups under consideration. The total rates, 107 and 152, have a ratio of 1 to 1.42, almost half as many more per case treated than in Clinic II.

According to the total averages for the types it is seen that type 4 symptoms are the most numerous, due to their comparatively great frequency in Clinic II. Type 2 is the most frequent in Clinic I, and the second most frequent in the total average; the variation in recording this type is greater in both clinics than with any other, for in all others the clinic average approaches closely or attains the average of the extremes shown. Types 3 and 5 total nearly the same. As would be expected,

the former is much the more frequent in Clinic II. The latter, on the other hand, is slightly more frequent in Clinic I, suggesting that cases that are less advanced and more favorable for treatment are more apt to react in this manner to the treatment.

RELATION OF COMPLAINTS TO CERTAIN FACTORS

It is desirable to determine the relation of frequency and types of complaints to the factors of sex, age, duration of the disease, and variations in methods of treatment. In the present analysis, through oversight, data on duration were not obtained, but they have been obtained in connection with the comparisons made subsequently, and will be discussed in the third paper of the series. Only the total frequency rates are given in these analyses.

RELATION OF SEX TO NUMBERS COMPLAINING

The data have been tabulated only with respect to the number complaining; the figures are not presented, as no difference is found. The males constituted 65 per cent of the whole, the females, 35 per cent; of the former 70.7 per cent are recorded as having complained, of the latter, 70.3 per cent.

RELATION OF AGE TO COMPLAINTS

The factor of age in the production of complaints would be expected to be of little importance, since the age distribution of a leper population is very different from that of a normal population, the extremes being poorly represented. However, the figures show certain points of interest.

In Table 5 are given the percentage distribution by decades, the percentages of each group for whom complaints were reported, and the complaint rates.

TABLE 5.—*Distribution of cases by age groups, percentages of each complaining, and complaint rates.*

Age group.	Age distribution (percentages).			Patients complaining (percentages).			Excess rates (patient complaining).		
	Clinic I.	Clinic II.	Total.	Clinic I.	Clinic II.	Total.	Clinic I.	Clinic II.	Total.
Years.									
To 10	2.8	0.5	1.8	58	(a)	60	0.92	(a)	0.77
11 to 20	26.8	16.0	21.8	64	70	66	0.76	0.84	0.79
21 to 30	32.7	37.6	35.0	61	82	72	0.68	0.91	0.81
31 to 40	19.6	23.0	21.2	66	80	73	0.71	1.12	0.94
41 to 50	8.3	10.5	9.3	61	78	70	0.59	0.99	0.82
51 to 60	6.9	7.2	7.1	62	80	71	0.69	0.97	0.84
Over 60	2.8	5.0	3.9	60	70	66	1.00	1.13	1.08

[a] Too few to justify a figure.

Age distribution.—Of the 2,796 cases included in this analysis more than one-third are in the third decade. The second and fourth decades show nearly equal numbers. But 50 patients (1.8 per cent) were 10 years or less, most of them born at Culion; Clinic I has the majority of these. Probably not less than three-fourths of those in the 11 to 20 group are above 15 years, leaving roughly only 6 to 7 per cent of all at or below that age. As the dosage for those above 15 years has seldom to be modified on account of age, this factor is not important in that connection. At the other extreme only 11 per cent are more than 50 years old, and only 20 per cent are above 40 years of age; there is a predominance of these in Clinic II.

Calculating the average ages by multiplying the total number of cases in each group by the mean age figures, the figures arrived at are: Total, 30.3 years; Clinic I, 29.2 years, Clinic II, 32.2 years. The difference is undoubtedly more important as regards duration of the disease and, therefore, of the general condition of the patients than it may seem.

Complaints.—There is no marked variation with age in percentages complaining, there being only a slight and not regular increase in the middle-aged groups. There is, however, a decided increase in the excess frequency rates. Younger people may naturally be less apt to have complaints. Though the oldest may be more so, they are on the whole cases of longer duration in whom the disease is less active. Whatever difference there might be has evidently been in the main controlled by the fact that the clinicians adapt treatment to the individual cases.

Type complaints.—Though the total figures show little of interest, there are differences in the types, as is seen in Table 6. Here the data are given for twenty-year groups, but in the discussion the findings by decades will be referred to also.

TABLE 6.—*Relation of complaint types to age.*

[Rates per 100 cases in age group.]

Age group.	Number of cases.	Type 1.	Type 2.	Type 3.	Type 4.	Type 5.
Years.						
To 20	658	3.8	40	18	35	19
21 to 40	1,571	7.3	33	26	45	23
41 to 60	459	7.8	37	28	36	20
Over 60	108	10.2	38	25	37	27

Type 1 complaints increase decidedly with age, with three distinct phases. Up to 20 years the rate is about 4; from 20 to 60 years, about 7 to 8; and above that, over 10. The increase is, we assume, referable to the size of the venous channels. As the size increases with maturity, and again in those approaching senility in whom the increased size is associated with decrease in fat and in tone of the surrounding tissues, the chance of fortuitous intravenous injections increases. Type 2 complaints seem not to depend on age to any great extent, except that in the youngest they were most frequent. For the first three decades together the average rate (obtained from the original figures) is 34, that of the last four is 37, an insignificant increase. Type 3 complaints are considerably less frequent in the youngest, and fairly uniform in the older, according to the figures here shown; however, the first three decades average but 21, as compared with 29 for the last four. Type 4 complaints show no essential differences except for the high rate in the 21 to 40 group; however, the first decade actually has a low rate, the second approaching the highest rate here shown. In the three decades from 11 to 40 the rates average 43, in the last three, 36. Type 5 complaints are infrequent in the youngest and thereafter do not vary essentially. Indeed, the average rates for the three decades from 11 to 40 and of the three older ones are practically the same, 21.9 and 21.4, respectively. However, the highest figure is in the oldest group, a somewhat surprising finding.

RELATION OF TREATMENT FACTORS TO COMPLAINTS

The physicians' reports cannot be expected to yield direct or accurate information as to the kind or number of symptoms produced by various dosages and amounts of the drugs given. To obtain such data it would be necessary arbitrarily to fix these factors and to apply them inflexibly in strictly comparable groups of cases. This sort of experimentation is, of course, not permissible and has not been contemplated. The treating staff is primarily responsible for the welfare of the patients, and the methods must be varied to meet the needs of individual cases by reducing or increasing dosage, omitting injections, and even dropping patients from a group. By such clinical control the patients who complain most will be given the least treatment, and the degree to which this method is followed will

indicate the care exercised by the clinician. Of course, this care can be overdone, for in the interest of therapeutic effect it is better to push the medication, even at the cost of relatively unimportant disturbances, than to reduce it below an effective level.

In such an analysis the total figures for a group of physicians will be much more significant than will those for the individuals. Had each physician treated strictly comparable groups of patients and used exactly the same criteria and care in recording complaints, but used different methods, the results would be comparable; but when, as here, in a campaign in which an attempt is made to follow uniform methods, the personal equation leads different physicians to use distinctly different methods of treatment, it cannot be expected that close similarity in other phases of the work will be attained. Therefore, while the personal equation will probably not nullify the value of a comparison of drugs used by all physicians, it must be taken into account if any conclusion is to be reached in a comparison of methods.

Methods used.—To compare the methods and reported results of the individual physicians a summarization of the treatment factors for each clinic unit is given in Table 7, and of their complaint data in Table 8. In these only the cases receiving iodized preparations are considered, for in Clinic I those given the plain drug were injected twice a week and so are not comparable with the others. The plain-drug groups are, therefore, also eliminated from Clinic II figures, since this drug has complaint rates that were in certain respects unlike those of the iodized.

The distribution of dosage, etc., is in each case a condensation from a more-detailed tabulation and so arranged as to show what we consider low, medium, and high, respectively. The averages are calculated from the original tabulations, and while not as accurate as if they had been obtained by additions from the original detailed reports are sufficiently so for our purpose.

Inspection of Tables 7 and 8 shows considerable variations of practice in treatment and of apparent effects in the matter of complaints, with little indication of relationship between these. It would be fruitless to discuss them in detail, but a few features will be pointed out.

Altogether, one-third of the cases received low doses, and only 16 per cent fair to high doses (more than 3 cubic centimeters). Somewhat over one-half received a satisfactory number of injections, this influenced by the numerous extra doses in three units. Even so, but 21 per cent received more than 25 cubic centimeters. With an average dose of less than 3 cubic centimeters and an average total amount of 18 cubic centimeters in two months, the treatment given cannot be called intensive. Two factors outside the control of the physicians may have been responsible for this. One is the climatic condition, the period involved having been the hottest, most trying part of the dry season; the other is the medicaments used, the dosages, etc., of which are compared in the second paper of this series.

The Clinic I physicians gave on the average somewhat the lower dosage; that they had fewer complaints is not necessarily due to this factor. They also gave the most injections, whether the total figures be compared or those of units I,1 and I,3 with II,1; II,2; and II,3; these being the five in which few or no more than 9 injections were given in the two months. These averaged but 6 injections instead of the 6.67 of the table, and their average total amount is but 16.7 cubic centimeters.

The methods by which approximately similar average total amounts were attained are of some interest, as for example the differences in dosage and numbers of injections in I,3 and I,4. These are best seen in Table 8. From a comparison of the figures of II,2 and II,3 the impression would be gained that by giving smaller doses more injections can be given and so larger amounts, but on comparing the former with II,1 the opposite impression would be gained. It is impossible to arrive at any conclusion from these data.

Complaints to methods, by treating unit.—In comparing the complaint figures with the treatment practices (Table 8) another disturbing factor is introduced, that of variation in recording. In view of this and of the variations in method the fair uniformity of most of the figures on patients complaining in each clinic is surprising. In each there is one low figure; that for I,3 may perhaps be ascribable to the practice followed, but that in II,4 could hardly be so explained. There is, therefore, no apparent relation between the percentages complaining and the method. Neither is there any as regards the complaint rates.

TABLE 7.—*Dosage, numbers of injections, and total amounts of drug given, by clinic units.*[a]

[Percentages of patients under iodized preparations only.]

Clinic unit.	Cases.	Treatment factors.											
		Dose.				Number of injections.				Total amount.			
		1–2 cc.	3 cc.	+3 cc.	Average.	1–4	5–6	+6	Average.	0–5	15–25	+25	Average.
I, 1	324	41	53	5.9	2.62	22	37	41	5.96	49	45	5.9	15.3
I, 2	329	34	42	24	2.92	10	19	71	7.63	24	41	34	22.2
I, 3	314	9.1	90	0	2.89	12	31	56	6.59	28	61	11	18.2
I, 4	301	59	22	19	2.32	6.3	18	75	7.98	51	26	23	17.2
Total	1,268	36	52	12	2.69	13	26	61	7.03	38	43	19	18.2
II, 1	139	18	40	42	3.30	24	33	42	5.94	34	37	29	19.4
II, 2	155	39	44	17	2.74	23	37	39	6.03	49	30	20	16.9
II, 3	245	32	50	18	2.84	39	31	30	5.35	59	28	13	15.0
II, 4	202	27	51	22	2.95	12	19	68	7.34	22	40	38	22.2
Total	741	29	47	23	2.93	26	30	45	6.15	42	33	24	18.3
Grand total	2,009	33	50	16	2.77	18	28	55	6.67	40	40	21	18.2

[a] Numbers of injections and total amounts of drug given in units I,2; I,4; and II,4 increased by numerous extra injections during the period considered.

TABLE 8.—*Relation of complaints, total and by types, to treatment methods.*

[Patients under iodized preparations only.]

Clinic unit.	Treatment averages.			Patients complaining (per cent).	Complaint rates (excess).	Complaint type rates (total).				
	Dose.	Number of injections.	Total amount.			Type 1.	Type 2.	Type 3.	Type 4.	Type 5.
I,1	2.62	5.96	15.3	65	0.34	4.9	4.0	15	43	20
I,2	2.92	7.63	22.2	61	0.53	7.0	9.7	16	27	33
I,3	2.87	6.59	18.2	45	0.36	4.5	5.1	7.6	23	21
I,4	2.32	7.98	17.2	67	0.68	7.6	51	23	15	17
Total	2.69	7.03	18.2	59	0.49	6.0	17	15	27	23
II,1	3.30	5.94	19.4	76	0.58	6.5	2.9	32	63	16
II,2	2.74	6.03	16.9	86	1.39	13	31	46	90	26
II,3	2.84	5.35	15.0	80	0.83	20	5.3	22	75	24
II,4	2.95	7.34	22.2	56	0.39	11	2.5	25	21	19
Total	2.93	6.15	18.3	74	0.83	13	9.4	30	61	22
Grand total	2.77	6.67	18.2	65	0.63	8.7	14	21	40	22

The figures for complaint types also fail to show any regular relationship to method, though there are suggestions of this. Type 1 would be expected to be related chiefly to the number of injections and to be affected least by the personal equation; there is such an agreement in Clinic I, but not in all units of the other. There is no relation to dosage; indeed, unit I,4, with most 1 and 2 cubic centimeter doses, has the highest type 1 rate of that clinic. Type 2 would probably vary rather more with the size of dose than with the number of injections. Such a relation might be concluded from the figures of the first three units of Clinic I, but the variation in the other units is extremely great. That the figures for types 3 and 4 are not related to the treatment factors is not unexpected, because of modification of treatment when they occur. In Clinic I there is seen on the whole a direct variation of type 5 with the total amount of drug, but in Clinic II the reverse is found.

Complaints to methods, totals.—The total figures offer a more satisfactory basis for comparing the complaints with the treatment method. Each physician would use the same method of recording for his 2-cubic-centimeter group, for example, as for his 4-cubic-centimeter group, and the effects of differences of criteria and assiduity of recording in the group as a whole tend to be done away with by the averaging of the extremes. Further, the data on all treatment groups can be used in this analysis.

Dosage.—The data examined from this viewpoint are given in Table 9. Forty-eight per cent of all cases received medium

TABLE 9.—*Relation of complaints to dosage.*

Dosage.	Cases.		Patients complaining.	Complaint rates (excess).	Complaint type rates (total).				
					Type 1.	Type 2.	Type 3.	Type 4.	Type 5.
cc.	*Number.*	*Per cent.*	*Per cent.*						
1	197	7.0	68	0.89	6.1	33	31	34	24
2	812	28.8	78	1.01	7.8	44	23	53	39
3	1,362	48.4	67	0.75	7.0	27	24	40	20
4	398	14.1	69	0.57	6.5	41	22	26	14
5	49	1.7	55	0.66	6.1	31	26	22	6

average dosages, 2.6 to 3.5 cubic centimeters, and but 16 per cent received higher doses. In almost all columns of this table the 2-cubic-centimeter group has the highest figures, and usually the 1-cubic-centimeter has more than the 3-cubic-centimeter group. The numbers of patients complaining and the

total complaint rates decrease in the higher groups, with minor variations. As for the types, type 1 unexpectedly decreases from 7.8 in the 2-cubic-centimeter group to 6.1 in the +4-cubic-centimeter group, suggesting a tendency to susceptibility on the part of some patients with consequent reduction of doses. Types 2 and 3 show no regular variations except a drop from a maximum in the 1-cubic-centimeter group; evidently the dosage is on the whole reduced in proportion to the liability of the patients to complain of these disturbances. In types 4 and 5 the rates decrease markedly, indicating that they are considered important causes for reduced dosage. This was expected of the former, which are most important complaints. The reduction of dosage with the latter occurs both on resumption of treatment and during continued treatment in the mild reactions.

Numbers of injections.—The data on numbers of injections are given in Table 10. The distribution of cases here seen is modified by the inclusion of the group receiving plain ethyl esters twice a week; the last group comprises only such cases and so is not at all comparable with the others.

TABLE 10.—*Relation of complaints to numbers of injections.*

Number of injections	Cases.		Patients complaining.	Complaint rates (excess).	Complaint type rates (total).				
					Type 1.	Type 2.	Type 3.	Type 4.	Type 5.
	Number.	*Per cent.*	*Per cent.*						
1 to 4	574	20.4	87	2.16	7.3	31	31	78	39
5 to 8	1,632	57.9	69	1.72	6.3	33	22	39	19
9 to 12	566	20.1	56	1.76	9.9	40	24	14	10
+12	46	1.6	74	2.12	2.2	104	24	13	13

Except as affected by the last group referred to, there is a steady decrease in percentages of patients complaining, but in complaint rates only from the first and highest group. Type 1 is highest in the third group, as would be expected; that the first is higher than the second again suggests that some cases in the former group are susceptible to this disturbance, wherefore they are injected less frequently. Type 2 increases with the number of injections but not proportionately, because of clinical control. Type 3, as before, is practically uniform except that the first group is highest; actually, the patients responsible for this higher figure had received but one or two injections. In types 4 and 5 the rates decrease, as with dosage, but much more rapidly and markedly, indicating that the number of in-

jections is reduced more than the size of dose in patients complaining of them.

Total amounts of drug.—The complaint data arranged in relation to this factor are given in Table 11. Here less than one-half of the cases falling in the last group are of the twice-a-week plain-drug group, so the figures are more comparable with the rest of the table than those in Table 10.

TABLE 11.—*Relation of complaints to total amount of drug given.*

Total amount.	Cases.		Patients complaining.	Complaint rates (excess).	Complaint type rates (total).				
					Type 1.	Type 2.	Type 3.	Type 4.	Type 5.
cc.	*Number*	*Per cent.*	*Per cent.*						
To 10	618	21.9	83	2.13	7.7	32	29	69	38
11 to 20	1,124	39.9	74	2.62	6.8	36	24	44	22
21 to 30	763	27.1	59	1.66	6.5	33	22	25	12
31 to 40	245	8.7	60	1.62	10	34	27	16	9.3
+40	68	2.4	51	1.71	5.9	56	18	2.9	5.9

From Table 11 it is seen that 62 per cent of all cases received 20 cubic centimeters or less. The percentages complaining decline throughout, though not regularly. The complaint rates are much the same in the last three groups; the first two had comparatively very high rates. In other words, that so many patients were given small amounts was in the main because of comparatively very frequent complaints; that many (22.5 per cent) of these cases had no complaint during this period is, presumably, either because they persistently absented themselves or because of complaints previously suffered. It must be left to the treating physician when (and whether) cases in the latter category should, after a period of reduced treatment, later be given more-intensive treatment in the interest of improvement in the basic disease. Type 1 complaint rates are naturally irregular here, since they decreased with higher dosage and irregularly increased with frequency of injection. Type 2 rates, in spite of the upward trend with injections, vary as they did with dosage except in the last, the highest group. Type 3, as usual, shows no significant variation. Types 4 and 5, as always, decrease, and markedly so.

SUMMARY

The present series of papers deals in considerable detail with the various side-effects observed in and complained of by patients under treatment with chaulmoogra ethyl ester prepara-

tions. This is an important but hitherto not intensively studied phase of leprosy-treatment work, particularly in institutions in which advanced cases are dealt with. The first two papers are based on reports from the eight units of the two main treatment clinics, covering the period from April 15 to June 15, 1923. These reports were obtained primarily for the purpose of comparing, from this aspect, the 2 per cent iodized preparation of chaulmoogra ethyl esters (theretofore extensively used) and a 0.5 per cent iodized preparation. The comparison was extended to include the groups under the plain (noniodized) ethyl esters. The present paper deals with the relation of general factors to the complaints reported, without regard to the preparations used; the comparative data are presented in the second paper.

From the nature of the data it is not possible to draw as accurate conclusions as if the treating physicians were required to apply uniform, standardized methods; it is considered necessary to allow them wide latitude in dealing with the cases for whose welfare they are immediately responsible. The personal equation affects or determines the findings in certain analyses, but in others it is neutralized; on the whole, the findings are believed to be significant. Not only are variations seen in the individual unit reports, but there are decided differences between those of the two clinics, for which reason the clinic totals frequently have to be considered separately. The difference is no doubt in some part due to differences in the patients treated, those in Clinic I having been to a considerable extent selected, and under treatment longer; but there is evidence that the personal equation is an important factor.

The total number of treated patients on which the first two reports are based is 2,818. Their distribution by treatment units is given (Table 1), together with the numbers of patients reported by each physician as complaining. A little more than one-half of the cases were in Clinic I. Seventy per cent of all were credited with complaints. In Clinic I 63 per cent were so reported; in Clinic II, 79 per cent.

The complaints recorded fall into five natural groups or types: (1) Immediate effects (coughing and choking, and dizziness), which are temporarily disturbing, even alarming to the patient, but not particularly important; (2) local effects (inflammation and abscess), which are undesirable in that they tend to discourage the patient if frequently repeated; (3) general symptoms (headache, malaise, simple fever, etc.), of variable

importance but on the whole undesirable; (4) respiratory tract symptoms (chest pain and oppression, and cough), the most important of the group because of the frequency of pulmonary tuberculosis in lepers and the tendency of the drug to aggravate this; and (5) lepra reaction symptoms (lepra fever, cutaneous eruptions without fever, etc.), the milder forms of which may be desirable. A sixth group, referring to kidney disturbances, should be distinguished, but this could only be done on the basis of frequent urinalyses of all cases under treatment.

In considering the frequency of complaints, both the percentages of patients complaining and the number of complaints are taken into account. The latter are treated either as "total" rates (per 100 cases in the entire group considered) or as "excess" rates (the number in excess of one per patient complaining).

The frequency of the principal individual incidents is shown (Tables 2 and 3) in percentages and excess rates. Though the unit reports vary more or less widely, in most instances the clinic averages are valid for purposes of comparison with each other, though their absolute values may be far from accurate. Of type 1 complaints, a total of 4.9 per cent of those treated were credited with choking, with an average excess rate of 0.11. These were the more frequent in the Clinic II cases. Dizziness, on the other hand, with 1.5 per cent, occurred in relatively more Clinic I cases. Of type 2, abscesses were infrequent. Induration was reported extremely irregularly. The general average, 21.3 per cent, is believed much too low, though the average rate, 0.63, seems more nearly correct. Of type 3, headache was recorded very irregularly. Malaise and weakness were, as would be expected, much the more common in Clinic II, 9.9 per cent as compared with 3.4 per cent. The figures for simple fever are less different. Chest oppression and chest pain (type 4) are very important complaints. Fifteen per cent of all complained of these, 9.9 per cent in Clinic I and 20.7 per cent in Clinic II. Though simple cough is less apt to be complained of and recorded, the figures are somewhat higher, with 19.1 per cent of the total complaining. The clinic averages differ less than their rates. Hæmoptysis was reported only from Clinic II. The findings are in keeping with the fact that the Clinic I cases are decidedly the better off as regards pulmonary complications. Cutaneous reaction and lepra fever, unlike most others, have the higher percentages in Clinic I, 15.6 to 12.8, suggesting that these more favorable cases are

somewhat the more prone to these disturbances. The minor disturbances of this type occurred practically equally in the two clinics.

Since in the further analyses the complaints are considered by types rather than individually a summary of the percentages of all complaints of each type is given (Table 4). The ratio of total complaints is 1 for Clinic I to 1.42 for Clinic II. Type 4 has the highest percentage, though it is believed that type 2, which is second, should be first, and type 3 second. As reported, the totals for types 3 and 5 are nearly equal, though the clinic totals differ, the former being more frequent in Clinic II and the latter in Clinic I. It is probable that the figures for types 1, 4, and 5 approach the actual.

The relation of frequency of complaints to the factors of sex, age, and method of treatment, referring to average dosage, number of injections, and the consequent total amount of drug given each case, has been examined in some detail.

There is practically no difference in the number of patients of each sex who complained, the percentage of males being 70.7 and of females 70.3.

The generally low age of leper populations is seen here (Table 5), nearly 60 per cent being 30 years old or less; the average is about 30.3 years. Few (1.8 per cent) are 10 years old or less; most of these were born at Culion. The age distribution in the clinics is not uniform, the average for Clinic I being 29.2 and that for Clinic II, 32.2, a difference of some importance in connection with duration.

As would be expected in so abnormal a population, little relation is seen between age and the frequencies of total complaints, there being only a slight rise to the fourth decade. However, this is not true of the types (Table 6). Type 1 increases with age, being least in children, whose blood vessels are small, and most in the aged, approaching senility. Type 2 is comparatively high in children, and slightly lower in young adults than in the older. Type 3 is lowest in the youngest but comparatively uniform thereafter. Type 4, also lowest in the youngest, is highest in the younger adults. Type 5 is on the whole not essentially different after the low youngest group except for a somewhat higher rate in the most aged, the last an unexpected finding.

In considering the relation of treatment factors to complaints it is not to be expected that a direct relationship would be seen between the intensiveness of treatment and the numbers of com-

plaints, even were there no individual differences in recording, for it is obligatory on the clinician so to adjust his treatment as to minimize disturbing side-effects. Two trends are seen, the natural one due to direct effect of the drug, and the artificial one due to clinical control. The latter, naturally, is predominant and usually causes the figures to fall with increase of treatment rather than the natural reverse.

For purposes of orientation, the methods of each physician are first examined (Table 7), and the complaint figures in relation to these (Table 8). Wide variations are seen in dosage practices, numbers of injections, and consequent total amounts of drug given. The general average dose is but 2.77 cubic centimeters, slightly less in Clinic I, more in Clinic II. Even with fairly numerous injections the total amount is low, averaging but about 18 cubic centimeters in two months. The average number of injections for those actually giving the drugs but once a week is 6, and the average total amount is but 16.7 cubic centimeters. This is not intensive medication. Whether the climatic conditions or the preparations used influence this cannot be said.

The attempt to correlate the complaint data with the treatment methods of the individual workers is rendered entirely unsatisfactory by the unavoidable personal factor in the matter of criteria as to what should be recorded and, apparently, in regularity of recording. No apparent relationship is seen with the numbers of patients complaining or the total complaint rates, though with certain of the types there is an indication of the expected relationship.

In analyzing the total figures for complaints with relation to the treatment factors of dosage (Table 9), numbers of injections (Table 10), and total amount of drug given (Table 11), the influence of the personal equation is more or less overcome, since the extremes tend to neutralize each other. Due to clinical control of treatment, the percentages complaining decrease in all three analyses, most markedly in relation to total amount because this reflects the combined decreases with dosage and numbers of injections. The complaint rates, however, do not decrease so regularly, showing a rise in the highest group in each table.

In these analyses the rates for type 1 tend to decrease in the higher-dosage groups, suggesting that there are a certain number of cases particularly susceptible to this reaction and therefore given less treatment (clinical control), while they increase

somewhat with increased injections (modified natural effect). Type 2 shows the natural increase with number of injections, though much less than if not largely controlled clinically. The rates do not increase with this factor. Type 3 is most frequent in all the lowest groups, but thereafter shows no definite tendency, evidently being controlled sufficiently to prevent an increase in rates, though not enough to cause a decrease; this is probably because it is more important to give as much medicine as possible than to avoid these complaints entirely. Types 4 and 5 both decrease markedly with dose and number of injections, and consequently with the total amount. It is evident that the complaints of these types are watched most closely and the treatment methods modified because of them more than with any other complaint.

CONCLUSIONS

Few conclusions are to be drawn from this paper, both because of its general nature and the influences affecting the data, though several points of interest are seen. The importance of complaints of patients in modifying the methods of treatment is emphasized. Their kinds and classification are discussed and so far as possible their relative frequencies as met with in this colony determined.

The sex of patients has no apparent influence on the number of patients complaining.

Age has little relation to the total numbers of complaints, but local irritation is apparently most frequent in the youngest, and most of the other conditions least frequent. Coughing and choking and lepra reactions are most frequent in the aged.

Wide variations in the reports of the individual physicians prevent drawing conclusions as to the effect of different tendencies in administering medication. It is found that on the average the amount of medication given during the period involved was decidedly not intensive.

Analysis of the general relation of treatment methods to complaints shows little of the natural relationship between dosage, etc., and frequency of the various complaints, indicating clearly that the treatment staff as a whole has been careful to modify the administration of the drug to the side-effects produced, particular attention having evidently been paid to the dangerous respiratory tract symptoms and to lepra reactions.

COMPLAINTS OF PATIENTS UNDER ANTILEPROSY TREATMENT, II

COMPARISON OF PLAIN CHAULMOOGRA ETHYL ESTERS AND TWO IODIZED PREPARATIONS [1]

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TOPICAL SUMMARY

Introduction.
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Numbers Complaining, by Treating Units (Table 2).
Frequency of Complaints.
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    Total amounts of drug to complaint types (Tables 10 and 11).
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INTRODUCTION

In the first paper of this series, based on reports obtained primarily for the purpose of comparing the frequency and kinds of side-effects observed in patients receiving plain and two iodized preparations of chaulmoogra ethyl esters, the general features of the matter were discussed. In the present paper the data for each of the preparations will be compared, in general along lines previously followed.

Late in 1921 the special treatment staff then at work decided that chaulmoogra ethyl esters constituted the medication of choice for general adoption. It had a decided advantage over the sodium salts of chaulmoogra and cod-liver oils in that these,

[1] This report is based on data obtained during the temporary service of the writer as acting chief physician and, as such, chairman of the staff committee controlling the treatment work. Acknowledgment is made of indebtedness to the clinic physicians on whose records the analysis is based. Published with the consent of the Director of Health and the approval of the Philippine Leprosy Research Board.

being given intravenously, required more time and skill to administer, which tended to limit the number of cases that could be treated, and that they could not be so given indefinitely on account of obliteration of the veins. The so-called Mercado mixture, used in parallel with these, seemed to have less therapeutic effect. In this preliminary work the ethyl esters were used without adjuvant, as it was desired to determine the merits of the basic medication. All of the first group of five hundred selected cases were given this thereafter. When antileprosy treatment was extended to more patients, the 2 per cent iodized preparation as then used in Hawaii was tried out and was found so much less irritating at the injection site that all of the new cases were put under it. By the first of January, 1922, approximately five hundred cases were receiving it, and by April 1, practically one thousand.

When the treatment staff was enlarged and a second clinic organized, late in March, 1922, it was decided that the cases treated there should be so divided between the plain and the iodized preparations as to permit a direct comparison of the therapeutic effect of the two. This could hardly be done in Clinic I, for the patients in the plain-drug group were comparatively few, had been somewhat carefully selected, had received treatment for a longer time, and were being injected twice a week, whereas those given the iodized preparations had not been so carefully selected and were being injected but once a week. Thus are explained certain differences in distribution of cases and treatment methods in the two clinics, and also in some part at least differences in the data reported.

In the course of time some of the staff members gained the impression that the iodine gave rise to certain side-effects on its own account. At the same time preliminary surveys of results of treatment had indicated that the iodine has no value whatever except that, in reducing the irritating quality of the plain drug, it permits somewhat more intensive medication. Assuming the latter finding to be correct, it was felt that it might be advantageous to reduce its concentration, provided, of course, that this reduction should not go to the extent of lessening its beneficial effect in decreasing irritation. It was therefore decided by the staff committee to try extensively a 0.5 per cent iodized preparation. The treating physicians were instructed to divide their iodized groups into two more or less equal subgroups, one to receive the new preparation, the other to continue under the old one to serve as the control. A little over two months

later the staff was requested to report on treatment given and complaints recorded for these groups, between April 15 and June 15, 1923, and for comparison similar data for the patients receiving the noniodized drug. It was realized that it would have been desirable to have a longer period elapse between instituting the new preparation and taking records for comparison, to allow the group under it to come to an equilibrium, as it were, but it was preferred not to delay in the matter. In spite of the shortness of the period, as will be seen, the results seem to be decisive.

DISTRIBUTION OF DRUG GROUPS

The basis on which the cases were supposed to be distributed in the three main treatment groups was not followed exactly, as is seen from the percentages in Table 1. Here, as in the other tables, self-explanatory symbols are used to indicate the drugs.

TABLE 1.—*Distribution of cases, by preparation.*

Clinic unit.	Number of cases.	C. E. I. 2 per cent.		C. E. I. 0.5 per cent		C. E.	
		Number.	*Per cent.*	*Number.*	*Per cent.*	*Number.*	*Per cent.*
I, 1	392	186	47	138	35	68	17
I, 2	360	185	51	144	40	31	9
I, 3	375	158	42	156	42	61	16
I, 4	382	154	40	147	38	81	21
Total	1,509	683	45	585	39	241	16
II, 1	291	70	24	69	24	152	52
II, 2	365	60	16	95	26	210	58
II, 3	355	164	46	81	23	110	31
II, 4	298	86	29	116	39	96	32
Total	1,309	380	29	361	28	568	43
Grand total	2,818	1,063	38	946	34	809	29

The total figures show a roughly equal distribution, more or less a third for each preparation, but the clinic figures differ decidedly. In Clinic I, where the great majority had been receiving the iodized, these were on the whole sufficiently equally divided in each unit; therefore, individual variations in practice of reporting complaints cannot affect seriously the comparison of these preparations. This is hardly true of the plain-drug group, for which the percentages range from 9.6 to 21. However, as these cases were supposed to be injected twice a week, in most instances their data cannot be used in comparisons with the iodized-drug groups. In Clinic II the variation

is more marked, which is unfortunate in view of the individual variations in reporting that have been seen in the first paper. The plain drug was being given to over one-half by two physicians, and to but one-third by the other two. The iodized-drug cases were in three instances not divided into even roughly equal groups. The 2 per cent groups vary from 16 to 46 per cent of the unit lists, and the 0.5 per cent from 23 to 39.

If the preparations differ widely in the frequency with which they cause complaints, as will be seen to be the case, this irregularity may help to explain some of those in complaint figures seen in Table 8 of the preceding paper. In the present connection, though it will not affect the individual unit rates for each drug, it will affect the total clinic rates. However, in analyses where figures from the entire staff are involved the extremes tend to neutralize each other, giving more dependable statistics.

NUMBERS COMPLAINING, BY TREATING UNITS

In connection with the possible effect of the personal equation on the figures obtained in the present inquiry, the percentages of patients reported from each clinic unit as complaining are shown in Table 2. For correlation, there are also given what are here called the "excess" complaint rates, indicating the average number of complaints reported in excess of one per patient for whom any complaint was reported.

It would appear from the first section of Table 2 that in four units the plain drug caused most patients to complain, in one instance more than twice as many as either of the other preparations; three units give this preparation practically the same as one or other of the iodized, while one gives it less than either. Comparing the 2 per cent and 0.5 per cent iodized preparations, four units give the former decidedly higher percentages, three give them practically equal figures, and one gives the latter the higher. These differences may be due to clinical control of the treatment; for instance, a unit (II, 3) that has the lowest percentage in the plain-drug group gave the lowest average total amount of drug (Table 7, previous paper); enough less may have been given to the group under this than to the others to prevent complaints. The data for the individual units have not been examined from this viewpoint.

TABLE 2.—*Percentages of cases complaining, by preparation and physician.*

[Complaint rates in excess of one patient complaining.]

Clinic unit.	C. E. I. 2 per cent.		C. E. I. 0.5 per cent.		C. E.	
	Complaining.	Complaints.	Complaining.	Complaints.	Complaining.	Complaints.
	Per cent.	*Rate.*	*Per cent.*	*Rate.*	*Per cent.*	*Rate.*
I, 1	63	0.35	68	0.33	85	1.52
I, 2	71	0.53	48	0.54	84	2.04
I, 3	44	0.40	46	0.32	97	1.15
I, 4	74	0.87	59	0.44	73	1.49
Average	63	0.55	55	0.40	83	1.48
II, 1	76	0.62	75	0.54	94	0.66
II, 2	90	1.61	84	1.24	92	1.60
II, 3	79	0.86	81	0.77	71	0.58
II, 4	69	0.66	47	0.11	71	0.81
Average	78	0.91	70	0.73	85	1.21
Total average	68		61		84	
Percentage averages:						
Clinic I	63	0.54	55	0.41	85	1.55
Clinic II	78	0.94	72	0.66	82	0.91
Total	71	0.74	64	0.53	83	1.23

The actual clinic averages, obtained from the original figures, are alike in giving the highest figures to the plain drug and the lowest to the 0.5 per cent iodized. The percentages for the former in the two clinics are nearly alike, but it would seem as if in Clinic II less difference was seen between the iodized and the plain preparations. The real explanation undoubtedly lies in the more frequent injections of the plain drug given in Clinic I, which apparently increased the complaints, thus raising the usually lower figure of that clinic.

The rates here given also show decided differences in different units, both absolutely and in the comparison, but the averages for both clinics place the preparations in the same order as before.

To test what effect differences in number of cases under each physician may have on the average figures, the unit percentages have been averaged directly. Thus are given the averages that would have been obtained if all physicians had had the same number of cases under each preparation. Several figures

change a little, but none markedly. This effect may, therefore, be ignored.

FREQUENCY OF COMPLAINTS

INDIVIDUAL SYMPTOMS

Though in subsequent analyses complaints will be treated by types rather than individually, it is well first to examine the frequencies of the more important symptoms under each preparation. In Table 3 the groups for the two iodized preparations are totaled for comparison with the plain. Both percentages complaining and excess rates are given.

TABLE 3.—*Comparing frequency of symptoms in cases under plain and iodized esters.*

[Complaint rates in excess of one per patient complaining.]

Symptom.	Plain esters (809 cases).		Iodized esters (2,009 cases).	
	Complaining.	Complaints.	Complaining.	Complaints.
	Per cent.	*Rate.*	*Per cent.*	*Rate.*
Choking	1.9	0.27	6.1	0.09
Dizziness	1.0	0.00	1.7	0.01
Induration	48.0	0.78	10.0	0.34
Headache	5.9	0.02	5.6	0.09
Malaise and weakness	9.3	0.08	4.9	0.09
Fever (simple)	13.0	0.18	7.7	0.11
Chest oppression and pain	14.0	0.10	15.0	0.24
Cough (only)	22.0	0.02	16.0	0.32
Lepra reactions	13.0	0.23	14.0	0.13
Eye inflammation	2.1	0.07	2.8	0.09
Miscellaneous	1.6	0.08	3.5	0.03

Choking and dizziness are both commoner with the iodized; the former occurred in more than three times as many persons per hundred under this preparation as with the plain. The frequency rates, however, do not correspond with this, but this lessens the difference only slightly. On the other hand, nearly five times as many patients under the plain were reported as having complained of local irritation, with much higher rates. Nearly twice as many under the plain complained of malaise and weakness and of simple fever. The headache figures show no real difference, there being a slight advantage for one in the percentages and for the other in the rates. Chest oppression and pain have also very similar percentages, though a somewhat higher rate with the iodized. Cough has somewhat

the higher percentage with the plain, but a much higher rate with the iodized, thus probably neutralizing any advantage. Lepra reactions are practically the same in both, except that the rate is higher with the plain. Eye inflammation, a somewhat infrequent complaint, occurred only one-third more frequently with the iodized, which is not in agreement with the impression that some had gained that it is much commoner with this preparation. Miscellaneous complaints (rheumatic pain, neuritis, and orchitis) were much more frequent with the iodized, but the total is so small that, though this relation is of interest, it is hardly important.

It having been seen that each of these preparations is the more productive of certain complaints, though on the whole the iodized has the advantage, it remained to determine similarly whether either of the two iodized preparations has any advantage in this respect. The findings are given in Table 4.

TABLE 4.—*Comparing frequency of symptoms in cases under 0.5 per cent and 2 per cent iodized esters.*

[Complaint rates in excess of one per patient complaining.]

Symptom.	C. E. I. 2 per cent (1,063 cases).		C. E. I. 0.5 per cent (946 cases).	
	Complaining.	Complaints.	Complaining.	Complaints.
	Per cent.	*Rate.*	*Per cent.*	*Rate.*
Choking	7.8	0.12	4.1	0.02
Dizziness	1.8	0.00	1.7	0.12
Induration	12.0	0.39	8.3	0.25
Headache	5.7	0.05	5.4	0.14
Malaise and weakness	4.8	0.04	5.0	0.15
Fever (simple)	8.1	0.14	7.3	0.07
Chest oppression and pain	15.0	0.25	15.0	0.22
Cough (only)	17.0	0.36	14.0	0.27
Lepra reactions	15.0	0.14	12.0	0.11
Eye inflammation	2.7	0.00	2.8	0.18
Miscellaneous	4.1	0.00	2.8	0.07
Total	95.0	0.21	79.0	0.15

The 2 per cent preparation is seen to have much the higher figures for choking, and somewhat so for simple cough, indicating that it is more irritating to the respiratory tract. Chest oppression and pain figures, however, are practically the same. As regards dizziness there is no important difference. The 2 per cent preparation has distinctly the worse figures for local irritation, indicating that in this concentration the iodine not only has

done as much as possible in reducing the irritating effect of the ethyl esters, but has begun to show one of its own; while 0.5 per cent concentration is not necessarily the optimum, it is clearly the better of the two used. In the type 3 symptoms (headache, malaise, and simple fever) the 2 per cent has, on the whole, slightly higher percentages, while the 0.5 per cent has moderately higher rates with two of these symptoms. In view of the fact that the plain drug gives the highest rates, it may be that 0.5 per cent is not sufficient to overcome this tendency. However, the difference is not great and may possibly be due to other factors. Lepra reactions and miscellaneous complaints are both somewhat the more numerous with the 2 per cent preparation. Eye inflammation, with practically equal percentages, has a higher rate with the 0.5 per cent, which indicates that the iodine content has little if any direct relation to this disturbance.

COMPLAINT TYPES

This question of the relative frequency of symptoms is summarized in Table 5, in which the "total" rates for the total of symptoms of each type are given for each preparation.

TABLE 5.—*Comparison of frequency of complaints, by types.*

[Total complaint rates per 100 cases treated.]

Complaints.	Plain (809 cases).	2 per cent iodized (1,063 cases).	0.5 per cent iodized (946 cases).
Type 1	3.1	11	6.3
Type 2	85	17	11.0
Type 3	32	21	20
Type 4	43	42	37
Type 5	19	25	20

As has already been seen, the plain drug has decidedly the advantage as regards the type 1 disturbances; the 0.5 per cent is, in turn, better than the 2 per cent. When the symptoms are thus combined the more weakly iodized has the advantage over the others in types 2 and 4, and is certainly no worse than the 2 per cent in type 3. With type 5, it is practically the same as the plain drug, and distinctly better than the 2 per cent iodized. From this analysis of total numbers of complaints it is decidedly the preparation of choice.

RELATION OF COMPLAINTS TO CERTAIN FACTORS

RELATION OF AGE TO TOTAL COMPLAINTS

In the general analysis it was found that there was no marked relation between the age of the patient and the total complaints, though certain of the complaint types did vary with this factor. In Table 6 this analysis is applied to the different preparations, the total rates for the different age groups being shown.

TABLE 6.—*Relation of number of complaints to age, by preparation.*

[Total complaint rates, per 100 cases in groups.]

Age group.	C. E. I. 2 per cent.	C. E. I. 0.5 per cent	C. E.
Years.			
To 20 [a]	108	81	182
21–30	120	92	185
31–40	130	106	194
41–50	110	92	187
51–60	119	85	182
Over 60	83	166	184

[a] Cases in first decade too few for accurate rates except in C. E. I. 2 per cent.

Here are distinct differences. With all three the highest group is in the fourth decade, as was the total in the general analysis. With the plain drug there is little decrease from this in either direction; on the whole, its rates vary but slightly. With both iodized preparations there is a decided drop in both directions; but in the oldest group, under the 0.5 per cent there is a marked rise, to twice that of the preceding group. Though there are but twenty-four patients in this group, the number is sufficient to make the rate of some significance. As will be seen, this is the only instance in which this preparation has such a change of trend. On analysis by types, not shown here, this increase is found to occur in all but type 2, which indicates that it is not fortuitous; no type increases, in this age group, with the 2 per cent preparation.

RELATION OF TREATMENT FACTORS TO COMPLAINTS

In the general analysis it was seen that the total number of complaints decreases somewhat in the higher-dose groups, and markedly in those given the most injections and, therefore, in those given the largest total amounts of drug. The data

for the three preparations used will now be examined to see whether they differ in this respect. Only the total complaints will be considered except in the analysis by total amount of drug given.

Dosage to total complaints.—The distribution of cases and the total complaint rates are given in Table 7. Here one rate is inclosed in double parentheses, because the group involved comprises less than ten cases, which makes the rate very unreliable; in Table 9 are rates based on more than ten but less than twenty cases; these are inclosed in single parentheses because still comparatively unreliable. Because the +4-cubic-centimeter groups are very small (20, 20, and 9 cases, respectively), the cases involved must be considered exceptional; therefore, the rates for the combined 4 and +4-cubic-centimeter groups given in the last line are more suitable for comparison with the other groups.

TABLE 7.—*Relation of dose to number of complaints, by preparation.*

[Total complaint rates, per 100 cases in groups.]

Average dose.	Preparation.					
	C. E. I. 2 per cent (1,063 cases).		C. E. I. 0.5 per cent (946 cases).		C. E. (809 cases).	
	Per cent of cases.	Complaint rate.	Per cent of cases.	Complaint rate.	Per cent of cases.	Complaint rate.
cc.						
1	7.0	132	6.5	100	7.4	157
2	28	144	25	107	34	211
3	50	105	50	90	43	174
4	13	95	16	84	14	161
+4	1.9	100	2.1	60	1.1	((144))
4 or more, combined	15	96	18	81	15	160

The 0.5 per cent iodized preparation has the advantage in that more patients under it were given higher doses, 18 per cent receiving more than 3.5 cubic centimeters as compared to 15 per cent with the other two preparations. In the lower groups the 0.5 per cent has fewest, the plain drug most.

The complaint rates at both extremes are best for the more weakly iodized, poorest for the plain. With all preparations they decrease with increase in dose, but not to the same extent. From the maximum to the average high-dose rates (last line), the decreases are, respectively, 33, 24, and 24 per cent of the maximum figure. By this the 2 per cent iodized has the greater

drop, but as the 0.5 per cent has the lower figures throughout (as well as an actually considerably greater drop in the +4-cubic-centimeter group), this can hardly be said to be a real advantage. Though the percentages of decrease for the 0.5 per cent iodized and the plain are the same, these preparations are not to be compared, on account of the very high rates of the latter.

Numbers of injections to total complaints.—In this analysis (Table 8) distinction is made between the plain-drug groups of the two clinics, because injections were supposed to be given semiweekly in Clinic I.

TABLE 8.—*Relation of number of injections to number of complaints, by preparation.*

[Total complaint rates, per 100 cases in groups.]

Number of injections.	Preparation.							
	C. E. I. 2 per cent (1,063 cases).		C. E. I. 0.5 per cent (946 cases).		C. E. (Clinic I) (240 cases).		C. E. (Clinic II) (569 cases).	
	Per cent of cases.	Complaint rate.	Per cent of cases.	Complaint rate.	Per cent of cases.	Complaint rate.	Per cent of cases.	Complaint rate.
1 or 2	3.5	203	3.8	158	2.9	((100))	8.3	217
3 or 4	14	189	14	145	7.1	312	27	224
5 or 6	27	114	28	124	13	233	37	179
7 or 8	31	94	33	68	24	233	23	138
9 or 10	20	98	17	58	18	216	6.0	88
11 or 12	4.7	104	3.7	40	15	211		
13 or 14					8.3	200		
More than 14					11	115		

The 2 per cent iodized has here a very slight apparent advantage over the 0.5 per cent in the distribution of cases. But this is the result of differences in methods; for in the reports of the five physicians who gave few or no cases more than 9 injections, 26 per cent under the 2 per cent received 4 or less against 18 per cent under the 0.5 per cent. The plain drug is far worse than the others in the numbers given few injections, particularly so in Clinic I since, on a twice-a-week basis, the four groups including from 1 to 8 injections are together equivalent to but two groups on the once-a-week basis. In Clinic I, 47 per cent of the cases fall within this low limit; in Clinic II, but 34 per cent. Therefore, few of these twice-a-week patients were injected with anything approaching regularity, as a result of which only a moderately larger amount of drug

was administered than in Clinic II, perhaps not much more than the differences in the cases themselves would explain.

The decreases in complaint rates with increase in number of injections, seen in the general analysis, are here seen in each group. As in Table 7, with the 2 per cent iodized preparation there is a terminal rise, whereas in the others there is a steady decrease after the maximum. The rates for the weekly plain-drug group decrease 61 per cent from its high maximum of 244, and in the semiweekly 63 per cent from the very high maximum of 312. For the 0.5 per cent iodized the decrease is 75 per cent from its comparatively low maximum of 158, while the lowest rate for the 2 per cent iodized is but 54 per cent less than the maximum, and that for the last group only 49 per cent less. This advantage for the 0.5 per cent iodized preparation is important.

Total amounts of drug to total complaints.—The figures on this factor (Table 9) naturally show the same variations as do those on dosage and on numbers of injections, though not in the same degree.

TABLE 9.—*Relation of amount of drug to number of complaints, by preparation.*

[Total complaint rates, per 100 cases in groups.]

Amount of drug.	Preparation.							
	C. E. I. 2 per cent (1,063 cases).		C. E. I. 0.5 per cent (946 cases).		C. E. (Clinic I) (240 cases).		C. E. (Clinic II) (569 cases).	
	Per cent of cases.	Complaint rate.	Per cent of cases.	Complaint rate.	Per cent of cases.	Complaint rate.	Per cent of cases.	Complaint rate.
cc.								
To 5	5.3	186	4.6	165	7.1	(165)	8.4	196
6 to 10	15	167	16	132	10	204	21	230
11 to 15	20	130	18	110	13	263	23	174
16 to 20	20	102	22	90	17	225	20	194
21 to 25	18	86	19	65	19	233	15	137
26 to 30	8.5	83	11	64	12	222	6.3	128
31 to 35	7.1	99	5.7	63	6.3	(220)	4.4	112
36 to 40	5.5	98	3.7	51	6.7	(131)	1.4	((12))
+40					8.3	120		

The disadvantages of the plain drug show up clearly here, 52 per cent receiving 15 cubic centimeters or less, and 72 per cent 20 cubic centimeters or less. Even in the twice-a-week group 31 and 47 per cent, respectively, are within these limits. Comparing the two iodized preparations, but 31 per cent of

the weaker received 15 cubic centimeters or less as compared with 41 per cent for the stronger, though on the 20-cubic-centimeter basis there is apparently no difference, 61 per cent of both groups being within this limit. But this again is because of extra injections for, in the five units not giving these, 54 per cent of the 2 per cent iodized received 15 cubic centimeters or less against only 35 per cent of the 0.5 per cent, while with the 20-cubic-centimeter limit the percentages are 81 and 55, respectively. This advantage for the 0.5 per cent is important, particularly when it is realized that this preparation caused decidedly fewer side-effects.

The amount of decrease in complaint rates for the plain drug in Clinic II, if we ignore the extraordinary last figure, is 51 per cent from the maximum of 230, and in Clinic I it is much the same, 54 per cent. The 0.5 per cent iodized decreases 69 per cent, but the 2 per cent iodized only 55 per cent at the minimum, and but 45 per cent in the last group.

In summary, it is seen from these analyses that even in the long-treated, selected Clinic I group the plain drug, which causes the most complaining, has the least decrease in rates in the cases receiving the more intensive treatment. That is, fewer patients are able to receive such treatment with few or no complaints. There is no reason to believe that the frequency of side-effects could not have been controlled with the plain drug as well as with the other preparations, but it is evident that this was not done, because to do so would have limited the amount given so much as to reduce unduly its therapeutic effect.

Both iodized preparations are far preferable in this respect, but even here there are distinct differences. Not only does the weaker preparation have lower rates in every instance, but these decrease more markedly from the maximum. Furthermore, they continue to decrease even in the most intensively treated groups, whereas the 2 per cent drug shows an upward trend in these, a peculiarity that is probably referable to the iodine itself, which is apparently present in excess.

Total amounts of drug to complaint types.—In a similar analysis of the total data [2] it was seen that not all types of complaints followed the trend of the total figures. This is a consideration of some importance for, if the more serious complaints (type 4 particularly) were not readily controlled clinically with

[2] Antea, p. 686.

one or another drug, this would affect the conclusion as to the relative value of that drug. In Table 10 the type rates for the plain drug are compared with those for the two iodized preparations; Clinic II data only are used.

TABLE 10.—*Relation of complaint-type rates to total amount of drug given, comparing plain and iodized ethyl esters, Clinic II only.*

[Total complaint rates, per 100 cases in groups.]

Total amount.	Number of cases.		Type 1.		Type 2.	
	C. E.	C. E. I.	C. E.	C. E. I.	C. E.	C. E. I.
cc.						
10	169	164	5.3	13	55	9.8
20	243	270	2.5	13	80	8.9
30	123	205	3.3	16	53	9.8
More than 30	33	99	3.0	11	42	10

Total amount.	Type 3.		Type 4.		Type 5.	
	C. E.	C. E. I.	C. E.	C. E. I.	C. E.	C. E. I.
cc.						
10	40	39	84	116	36	40
20	36	30	51	69	14	23
30	35	26	35	30	8.1	13
More than 30	30	34	9.1	17	3.0	8.1

Type 1 rates show no regular or significant change with either preparation. Type 2, however, decreases with the plain but not with the iodized; indeed, with the latter it probably actually increases, as seen in Table 11. However, the rates are comparatively very low. Type 3 on the whole decreases somewhat more with the iodized than with the plain. The iodized preparations have a distinct disadvantage in types 4 and 5.

To compare the two iodized preparations the figures for both clinics can be used, which is more satisfactory, as the peculiarities of reports from one clinic tend to modify those from the other. These rates are given in Table 11.

Here type 1 decreases but slightly with the 2 per cent preparation, more so in the 0.5 per cent until the last group, which is surprisingly high. Type 2 increases with both, though not regularly; the rates are higher for the 2 per cent throughout. It is doubted whether less local irritation than is here indicated can be gotten with any preparation now available. Type 3 increases with the 2 per cent, and decreases with the 0.5 per cent, a point decidedly in favor of the latter. Types 4 and 5

decrease very similarly, but the figures for the 0.5 per cent are lower. Type 4 was reported more frequently for the iodized than for the plain from Clinic II (Table 10), and only slightly less frequently than the plain in the total figures (Table 5); here it is seen to be distinctly less frequent with the 0.5 per cent in the groups receiving the larger amounts, indicating that it can be given somewhat more intensively in patients susceptible to respiratory tract trouble. The advantage is with the 0.5 per cent iodized preparation in each instance, and in some it is marked.

TABLE 11.—*Relation of complaint-type rates to total amount of drug given, comparing 2 per cent and 0.5 per cent iodized preparations, both clinics.*

[Total complaint rates, per 100 cases in groups.]

Total amount.	Number of cases.		Type 1.		Type 2.	
	2 per cent.	0.5 per cent.	2 per cent.	0.5 per cent.	2 per cent.	0.5 per cent.
cc.						
To 10	217	191	12	6.8	16	7.9
11 to 20	431	378	11	5.8	15	9.0
21 to 30	279	288	11	4.5	15	12
More than 30	134	89	10	13	32	20

Total amount.	Type 3.		Type 4.		Type 5.	
	2 per cent.	0.5 per cent.	2 per cent.	0.5 per cent.	2 per cent.	0.5 per cent.
cc.						
To 10	17	36	81	55	49	33
11 to 20	23	17	43	44	24	24
21 to 30	19	17	25	20	15	11
More than 30	29	13	16	6.7	11	4.5

SUMMARY

To determine which preparation will permit the most intensive treatment with the fewest undesirable side-effects, the comparative frequency of complaints of patients under treatment with plain chaulmoogra ethyl esters and of those receiving 2 per cent and 0.5 per cent iodized preparations has been investigated. The 2 per cent iodized had been used at Culion extensively since late in 1921; but, as it was thought to have side-effects of its own, it was desired to compare a weaker concentration with it.

The 2,818 cases dealt with are distributed as follows: Plain drug, 809 cases, of which 240 were supposed to be injected twice

a week (Clinic I), and 569 once a week (Clinic II); 2 per cent iodized, 1,063 cases; and 0.5 per cent iodized, 946 cases; both of the latter were supposed to be injected but once a week, but many were given extra, interpolated injections. The distribution of these cases in the clinic units (Table 1), is irregular, but when the total cases of both clinics are considered the effect of this on the principal figures is not important.

In the matter of percentages of patients under each preparation for whom any complaint is recorded (Table 2), there is a decided lack of unanimity among the individual physicians, suggesting that neither preparation is very different from the others. However, the clinic averages, in which the individual variations are more or less neutralized, show that the plain drug caused the most patients to complain, and the 0.5 per cent iodized the least. The same is seen in the complaint rates. The plain drug has rather similar average percentages complaining in the two clinics, but the complaint rates are decidedly higher in Clinic I, in spite of the more favorable cases there, probably due largely to the more frequent injections.

The relative frequency of the principal individual symptoms with the different preparations is examined (Tables 3 and 4), and the matter summarized by the total figures for each symptom-group (Table 5). The plain drug has lower figures than the iodized for type 1 (immediate choking, etc.) and type 5 (lepra reactions), but in both instances the 0.5 per cent iodized is lower than the 2 per cent; indeed, as regards type 5 it is practically the same as with the plain. The iodized preparations, on the other hand, have lower rates for type 2 and for most of the complaints of type 3; as regards the former the 0.5 per cent is decidedly better than the 2 per cent. Chest oppression and pain occurred in practically the same percentage with all drugs, but a somewhat larger number complained of cough with the plain and the 2 per cent iodized than with the 0.5 per cent iodized. Taking these factors together, the balance is in favor of the iodized preparations as a whole, and decidedly best for the 0.5 per cent.

Little relation is seen between age and numbers of complaints with the plain drug, but with the others the figures decrease in both directions from maxima in the fourth decade, though there is a curious sharp rise in the oldest group with the 0.5 per cent iodized.

As regards the size of the dose given, the 0.5 per cent has an advantage in the larger percentages given doses larger than

3.5 cubic centimeters. The complaint figures of all, due to clinical control, decrease with increase of dosage, the larger doses having been given to patients who complained less. No preparation has a distinct advantage in this, but the 2 per cent iodized has a disadvantage in that the decrease is interrupted, the rate for the largest dose group being higher than that of the preceding one.

With the numbers of injections there is more contrast. In the complaint figures the decrease in the higher groups is far more marked relative to the maximum than is the case with dosage. The plain drug has by far the most cases receiving few injections, while the 0.5 per cent has a decided advantage over the 2 per cent. The 0.5 per cent iodized has decidedly the advantage in degree of decrease, while the 2 per cent not only has less relative decrease, but again shows a terminal increase, here in the two highest groups.

The total amounts of drug given naturally have similar variations. Small amounts were given to the fewest cases with the 0.5 per cent iodized, only 35 per cent of cases actually injected but once a week having received but 15 cubic centimeters or less, as compared with more than 50 per cent who were given the other preparations. The complaint figures with the 0.5 per cent have a greater relative decrease than those for either of the others and, unlike those for the 2 per cent, they do not increase in the largest-amount groups.

Analysis of the relation of the complaint types to amount of drug given shows differences between the preparations in only two types. As these were used, type 2 decreased with increase of total amount of the plain drug but increased with both iodized; the 0.5 per cent has, as usual, the lowest rates. Type 3 decreased with the 0.5 per cent, but increased with the 2 per cent.

From these findings it is very clear that the plain drug is the least suitable of the three preparations for use as the basic routine medication in antileprosy treatment. The advantage for the weaker iodized preparation in that larger percentages were given higher doses, more injections, and therefore greater amounts of drug, would be important even were the figures on complaints equal to those for the 2 per cent; that at the same time the complaint figures, both for numbers of patients complaining and for numbers of complaints, are distinctly less is a further point decidedly in its favor.

It is pointed out that the higher complaint rates obtained with the plain and the 2 per cent iodized preparations on increasing the dose, etc., does not signify that this matter could not have been controlled, but that to do so would have required reducing the medication unduly in many cases. To obtain more therapeutic effect it was preferable to push the dosage, though the frequency of complaints was increased.

It may be remarked that information has recently been received [3] that, while at the outset a 4 per cent iodized preparation was used in Hawaii, this was soon reduced to 2 per cent and, more recently, to 1 per cent; use of the plain drug has practically been discontinued there. It was with some satisfaction that this corroboration of our main findings was received. While it cannot be positively asserted that the 0.5 per cent concentration is preferable to the 1 per cent, this seems quite likely. It has been seen (Table 5) that with type 1 complaints, of which the plain drug has least, the 0.5 per cent is better than the 2 per cent; that with type 5 the 2 per cent has the highest rate while the 0.5 per cent is practically the same as the plain; that with type 3 the two iodized are practically equal; and that the 0.5 per cent is the best with the important types 2 and 4. It would be surprising, indeed, if a stronger concentration of iodine would prove better.

CONCLUSIONS

The plain chaulmoogra ethyl esters are irritating, particularly to the tissues at the point of injection and to the respiratory tract, so much so as seriously to limit the intensiveness of treatment with it in a leper population such as that of the Culion colony.

Iodized preparations of the ethyl esters are much less irritating locally, which permits their more intensive use, and they also cause fewer complaints of general symptoms.

The 2 per cent iodized ethyl preparation, heretofore generally used, has, according to the data examined, certain minor but not insignificant disadvantages over the plain drug.

The 0.5 per cent iodized preparation is in several respects distinctly superior to the 2 per cent and, unlike this, in no important way compares disadvantageously with the plain drug. It is, therefore, the best of the three for routine antileprosy treatment.

[3] Hasseltine, H. E. Personal communication.

LAMPYRIDES ET TELEPHORIDES DES ILES PHILIPPINES

Par MAURICE PIC

Membre correspondant du Museum de Paris, Digoin (Saoûe et Loire), France

Les Malacodermes faisant l'objet du présent article appartiennent seulement aux groupes des Cantharides (ancien Telephorides) comprenant les Cantharini et les Malthinini aussi qu'an groupe des Lampyrides, ce dernier réduit à un petit nombre d'espèces; enfin, il est question ici d'une seule espèce de Drilides.

C'est grace aun interessantes communications de C. F. Baker que j'ai peu écrere le présent mémoire; aux espèces venant de Baker je n'ai presque rien ajouté personnellement, n'ayant obtenu précédemment que peu d'insectes de ces régions.

Aux espèces des Philippines je joins pour ne pas disperser trop les matériaux d'étude, provenant également des chasses de Baker, trois nouveautés originaires de Sandakan (Borneo) et une de Singapore, rentrant dans les Cantharides (Telephorides).

Ne sont par comprises dans ce mémoire quelques anciennes espèces de Malacodermes de l'île de Palawan, aucune espèce de cette ile ne m'ayant été communiquée par M. Baker.

LAMPYRIDES [1] ET DRILIDES

Les Lampyrides ayant été autrefois étudiés par feu mon ami E. Olivier, ce n'est que depuis sa mort que je me suis mis un peu à les travailler; actuellement je ne suis pas encore suffisamment documenté pour pousser a fond l'etude de cette famille, ma part contributive ici est donc restreinte et très incomplète.

Luciola abdominalis E. Oliv.

LUZON, Mount Banahao, No. 17140.

[1] Consulter pour les Lampyrides des Philippines, E. Olivier, in Baer "Coleópteres des Iles Philippines" Ann. Soc. Ent. Fr. (1886) 182 à 187.

Luciola bicoloriceps sp. nov.

Oblongo-elongata, nitida, explanata, flava, capite pro parte, antennis, tibiis pro parte tarsisque nigris.

Oblong-allongé, brillant, pubescent de gris, déprimé, nettement explané, flave avec la tête rousse, foncée postérieurement, antennes et majeura partie des tibias et tarses noirs. Tête creusée entre les yeux, modérément ponctuée; prothorax plus large que long, sinué antérieurement, presque droit sur les côtés, un peu rétrécé en avant, largement rebordé, sillonné au milieu, á ponctuation forte, rapprochée; écusson tronqué au sommet; élytres plus larges que le prothorax, non subparallèles, rétrécis a l'extrémité, à épaules arrondies, largement explanés, irréguliérement et assez finement ponctués, ciliés sur les côtés, pygidium échancré, dernier segment de l'abdomen subéchancré de chaque côté, postérieurement prolongé au milieu en un lobe court et large, tronqué au sommet.

Long. 7 mill.

MINDANAO, Iligan, No. 17137.

Ressemble un peu à *L. foveicollis* E. Ol. mais de coloration tout autre.

Colophotia praeusta Esch. et var.

La coloration noire est plus ou moins étendue à l'extrémité des élytres et le prothorax varie un peu de forme.

LUZON, Laguna Province, Los Baños, No. 17148. MINDANAO, Dapitan, No. 17147.

Colophotia brevis E. Ol. var. *a*.

Tête en partie flave.

MINDANAO, Bukidnon Province, Tangkulan, No. 17135.

Colophotia bakeri sp. nov.

Oblongo-elongata, nitida, flava, antennis tarsisque pro parte nigris.

Forme et coloration de *Luciola bicoloripes* Pic, sauf que la tête et les tibias (sauf parfois les antérieurs en partie obscurcis) sont flaves, mais de taille un peu plus grande avec la structure abdominale tout autre chez ♂. Le ♂ a les derniers segments abdominaux fortement entaillés et lobés, le dernier fortement entaillé au sommet, à côtés non épineux mais tronqués, le pygidium est profondement incisé; la ♀ a l'avant dernier segment ventral sinué au sommet et le dernier arqué au sommet.

Long. 9–10 mill.

MINDANAO, Surigao Province, Nos. 17136, 17139 ♀ ; 17138 ♂. A placer près de *C. concolor* E. Ol. très distinct par la structure abdominale du ♂.

Pyrophanes quadrimaculata E. Ol.

MINDANAO, Davao, No. 17146.

Ototreta bicoloripes sp. nov.

Oblongo-elongata, rufo-testacea, abdomine ad basin, antennis, tibiis tarsisque nigris, elytris nigris, diverse rufo-testaceo marginatis. Variat.: Elytris ad basin late rufo-testaceis (var. *basalis*) ; thorace in disco nigro notato et elytris ad basin et antice solum rufo notatis (var. *reducta*).

Oblong-allongé, peu brillant, finement pubescent, roux testacé avec la base de l'abdomen, les antennes, tibias et tarses noires; élytres noirs, diversement bordés de roux testacé chez forme type ou largement testacés à la base (var. *basalis*). Parfois le prothorax est plus ou moins maculé de foncé sur le disque, tendés que la bordure claire des élytres s'oblitere plus ou moins jusqu'à la base qui tout au moins reste claire (var. *reducta*). Tête large; antennes assez comprimeés; prothorax court, sillonné, à angles postérieurs un peu avancés, modérément ponctué; ecusson testacé ou plus ou moins foncé; élytres pas trés larges, subparallèles, densément ponctués.

Long. 5–6 mill.

MINDANAO, Butuan, Nos. 17149, 17160, 17150, 17153. Voisin de *O. debilis* E. Ol. distinct, à première vue, par la tête non foncée.

Ototreta subtilis E. Ol. var. **vittiger** E. Ol.

Ototreta subtilis est variable quant à la coloration du prothorax et des membres, mais la tête parait toujours foncée.

MINDANAO, Butuan et Surigao, Nos. 17156, 17157.

Ototreta bakeri Pic.

LUZON, Mount Maquiling. MINDANAO, Butuan, No. 17151.

Dodecatoma testaceiceps sp. nov.

Parum nitida, testacea, antennis, articulis 2 basalibus exceptis, oculis abdomineque supra pro parte nigris, elytris brevibus, valde dehiscentibus, testaceis, apice late piceis.

Un peu brillant, courtement pubescent de flave-testacé avec partie du dessus de l'abdomen, yeux et antennes, moins les 2 premiers articles noirs, élytres largement foncés à l'extrémité,

ces organes courts, dehiscents des la base, très fortement et ruguleusement ponctués postérieurement, presque mats. Tête assez petite, antennes robustes à article 3 allongé, 4 et 5 fortement dentés, suivants courts et subpectinés; prothorax court et trés large, subarqué sur les côtés, sillonné au milieu et fortement impressionné de chaque côté de la base, distinctement, mais non densément ponctué; écusson grand, tronqué au sommet, ponctué; élytres de la largeur du prothorax à la base, très acuminés postérieurement trés débordés par l'abdomen et les ailes; pattes assez robustes.

Long. 7 mill.

LUZON, Mount Maquiling, No. 17152.

Espèce distingue, à première vue, de *D. bicolor* Westh. par la tête testacée et les antennes plus robustes.

CANTHARIDES (TELEPHORIDES)

Les espèces rentrant dans les deux genres *Cantharis* L. et *Discodon* Gorh., originaires du Iles Philippines, se distingueront plus facilement a l'aide du synopsis suivant. Je dois faire observer que les espèces de Cantharides ne sont pas toujours surement classables au point de vue générique, à causes de la structure tarsale différente parfois suivant les sexes et aussi parceque l'on étudie quelque fois des insectes plus ou moins mutilés.

Je ne connais pas en nature *C. flavifemoralis* Blanch., décrit de l'ile de Mindanao, à moins que ce soit (ce qui est fort possible) la même espèce que *Tylocerus atricornis* Guer., dont il est question plus loin.

Le *C. philippinensis* Pic décrit sur un exemplaire de ma collection pas en très bon état de conservation, se distingue des espèces figurant dans le synopsis suivant par ses élytres franchement et complètement noirs, non granuleux et sans poils dressés et la tête, avec les yeux très gros, plus large que le prothorax.

Cantharis vanikorensis Boisd.

BASILAN. MINDANAO, Kolumbugan, No. 6677.

Cantharis granulipennis Boh.

LUZON, Benguet Subprovince, Baguio, No. 6680.

Discodon baguionum sp. nov.

Elongatum, nitidum, elytris subopacis, valde pubescentibus, pallido-testaceum, pro parte brunneum, capite postice elytrisque apice breve nigris.

Allongé, brillant avec les élytres densément pubescents de gris, ornés de quelques poils soulevés et presque mats, testacé-pâle rembruni par places, tête, sauf en avant, et sommet du élytres brièvement noirs. Tête pas trés large; antennes rembrunies, à base rousse, parfois foncées; prothorax court et peu large, arqué en avant; bimaculé de brun sur le disque postérieurement; élytres peu plus larges que le prothorax, longs, finement et densément ponctués; dessous du corps en partie roux, en partie rembruni; pattes grêles, testacées avec les tarses en partie rembrunis, parfois pattes noires avec la base descuisses largement testacée, un des ongles des tarses fendu chez ♂.

Long. 9–10 mill.

LUZON, Benguet Subprovince, Baguio, No. 8266.

Par sa coloration parait se rapprocher de *C. flavifemoralis* Blanch., que je ne connais pas en nature, mais les élytres sont moins largement noirs au sommet, la forme est plus gracile, la tête est en partie noire, etc.

Discodon tangkulanum sp. nov.

Elongatum, nitidum, parum pubescente et hirsutum, rufum, capite tarsisque nigris, elytris cyaneis.

Allongé, brillant, peu pubescent de gris et hérissé de poils obscurs sur les élytres, roux avec la tête et les tarses noirs, les élytres bleus. Tête assez large; prothorax court et large, subarqué en avant; élytres pas plus larges que le prothorax, assez longs, sinués latéralement, en partie granuleux; pattes robustes, tibias aplatis, un ongle des tarses fendu.

Long. 10 mill.

MINDANAO, Bukidnon Province, Tangkulan, No. 16162.

Peut se placer près de *D. fruhstorferi* Pic, très distinct par ses élytres bleu-violacés, le prothorax roux et plus robuste, les pattes plus fortes.

Discodon mindanaonum sp. nov.

Elongatum, nitidum, elytris subopacis, parum pubescentibus, rufo-testaceum, antennis late, tarsis elytrisque nigris, his ad basin paulo rufo-testaceo notatis.

Allongé, brillant avec les élytres subopaques, pubescent de jaune sans poils dressés, roux-testacé avec les antennes, sauf le dernier article, les tarses et les élytres noirs, ces derniers brièvement marqués de roux-testacé à la base. Tête grosse; antennes dentées, noires, dernier article roux; prothorax court et large, arqué en avant, puis impressionné de chaque côté; élytres peu plus larges que le prothorax, assez longs, densément

ponctués et un peu ruguleux avec des traces de côtés discales; pattes robustes, tibias en partie arqués, testacés avec les tarses noirs, parfois avec les genoux et partie des tibias foncés, un ongle des tarses en partie longuement dente, au moins chez ♂.

Long. 9–13 mill.

MINDANAO, Tangkulan, Iligan, et Surigao, Nos. 11164, 11165. Peut se placer près de *D. martapuranum* Pic, un peu plus robuste avec les antennes plus foncées et de structure différente.

Discodon atrocyaneum sp. nov.

Oblongo-elongatum, nitidum, elytris holosericeo pubescentibus, nigrum, thorace, scutello, abdomine pro parte, coxis femoribusque ad basin testaceis, elytris atrocyaneis.

Oblong-allongé, brillant, élytres revelus d'une pubescence grise soyeuse, noir, prothorax, écusson, parties de l'abdomen hanches et base des femurs, testacés, élytres d'un bleu d'acier. Tête large, antennes grêles, filiformes; prothorax court, un peu rétrécé en avant, subarqué antérieurement, roux-testacé, brièvement rembruni sur son milieu antérieur; élytres peu plus larges que le prothorax, relativement courts, sinués sur les côtés; finement et densément ponctués, pattes assez grêles, tibias en partie arqués.

Long. 7 mill.

Une ♀ de ma collection originaire de Mindanao.

Voisin de *D. tokianum* Pic, moins allongé avec les élytres non bordés de flave et à reflets bleus, les pattes bicolores.

Discodon surigaonum sp. nov.

Satis ♂, aut parum ♀, elongatum, nitidum, nigrum, thorace, scutello abdomine pro parte, coxis femoribusque ad basin testaceis.

Un peu ♂, ou à peine ♀, allongé, brillant avec les élytres à pubescence soyeuse, noir, prothorax, écusson, partie de l'abdomen, hanches et base des femurs testacés. Tête plus ou moins large suivant les sexes, noire, parfois un peu roussâtre en avant; antennes un peu robustes, noires, d'ordinaire avec le dernier article roussâtre a l'extrémité; prothorax court et large, presque droit sur les côtés ♂, un peu rétrécé en avant ♀; élytres à peine plus larges que le prothorax, relativement courts, finement et en partie ruguleusement ponctués; pattes assez grêles, un ongle des tarses fendu chez ♂.

Une variété ♀ a le prothorax maculé de noir en avant.

Long. 6–7 mill.

MINDANAO, Surigao, No. 17209.

Voisin du precédent et distinct, à premiére vue, par les élytres franchement noirs.

Discodon luzonicum sp. nov.

Elongatum, parum nitidum, testaceum, antennis, pedibus pro majore parte elytrisque nigris, his ad basin testaceo maculatis.

Allongé, peu brillant, à pubescence couchée grise ou jaune, testacé avec les antennes, moins le dernier article roux, les pattes moins les femurs largement testacés à la base et les élytres noirs, ces derniers ornés d'une macule basale testacée pas très grande. Tête grosse, antennes dentées; prothorax court et large, trés arqué en avant, impressionné sur les côtés et sillonné sur le disque; élytres à peine plus larges que le prothorax, longs, subparalleles, finement ponctués et en partie ruguleux dessous du corps testacé, abdomen rembruni; pattes assez grêles, ongles en partie dentés.

Long. 10 mill.

LUZON, Mount Maquiling.

Ressemble à *D. mindanaonum* sp. nov., plus haut, quant à sa forme mais le prothorax est plus arqué en avant et les élytres sont nettement marqués de testacé à la base.

Discodon sandakanum sp. nov.

Elongatum, nitidum, rufo-testaceum, oculis elytrisque lateraliter et apice nigris.

Allongé, brillant, modérément et finement pubescent de gris, roux-testacé avec les yeux noirs, les élytres étant ornés d'une bande longitudinale externe qui ne touche pas antérieurement le bord latéral et se prolonge étroitement au sommet. Tête grosse avec les yeux débordant le prothorax; antennes grêles, à articles médians subdentés; prothorax relativement long, arqué en avant, nettement sinué sur les côtés, impressionné sur son milieu postérieurement et sur les côtés; élytres un peu plus larges que le prothorax, assez longs, faiblement élargis postérieurement, à ponctuation fine et dense; pattes un peu robustes, tibias arqués.

Long. 8 mill.

BORNEO, Sandakan, No. 17184.

Ressemble par sa forme a *D. siobanum* Pic dont il différe nettement, en plus de la coloration très différente des élytres, par ces organes plus courts et plus brillant, ainsi que par la tête plus grosse.

Synopsis des espèces des genres Discodon et Cantharis.

1. Elytres entiérement, ou largement, foncés; prothorax entiérement testacé, ou roux, parfois seulement marqué de foncé au milieu antérieurement ..... 2.
   Elytres testacé-pâle, brièvement noirs au sommet; prothorax pâle, bimaculé de noir..... **Discodon baguionum** sp. nov.
2. Elytres entiérement foncés, ou brièvement marqués de roux à la base.... 3.
   Elytres verts, largement testacés a l'extrémité, ongles sinués.
   Cantharis vanikorensis Boisd.
3. Antennes noires, parfois à dernier article roux ou testacé, élytres variables et ongles des tarses aussi..... 4.
   Antennes testacées; élytres bleu métallique brillants, un ongle des tarses fendu..... **Discodon tangkulanum** sp. nov.
4. Elytres plus ou moins brillants, noirs, parfois à peine bleu d'acier, concolores ou non..... 5.
   Elytres mats, d'un noir verdâtre (parfois violacés, ex Boheman). Tête noire, ongles des tarses simples..... **Cantharis granulipennis** Boh.
5. Tête testacée; élytres diversement marqués de roux à la base..... 7.
   Tête foncée; élytres entièrement foncés; taille plus petite..... 6.
6. Elytres à reflets d'acier; prothorax paraissant plus large.
   Discodon atrocyaneum sp. nov.
   Elytres franchement noirs; prothorax moins large, au moins ♂.
   Discodon surigaonum sp. nov.
7. Elytres noirs, brièvement marqués de roux à l'extrême base; majeure partie des pattes testacée..... **Discodon mindanaonum** sp. nov.
   Elytres noirs, à base ocrée; majeure partie des pattes noire, cuisses testacées à la base..... **Discodon luzonicum** sp. nov.

Tylocerus atricornis Guer.

Espèce décrite de Manille et que je possède de Basilan (ex Doherty) et de Manille (ex Baer).

La variété nouvelle *cumingi* Pic a les pattes testacées avec les genoux et les tarses seulement foncés. Je la possède des Iles Philippines, sans autre indication de provenance, par la collection Gorham.

Tylocerus mindanaonis sp. nov.

Oblongo-elongatus, fere opacus, testaceus, antennis, capite postice ♂ pedibusque pro majore parte nigris, elytris nigris, dense griseo pubescentibus, lateraliter aliquot ad suturam, flavo marginatis.

Oblong-allongé, presque mat, testacé avec les antennes et les pattes, moins la majeure partie des cuisses, noires, élytres d'un noir gris, à pubescence soyeuse, au moins en partie bordés de flave. Tête testacée, parfois foncée sur le vertex; antennes différentes suivant les sexes, plus longues chez ♂ avec le 1er article grand et épais, toutes noires ou avec le 1er article taché de

roux; prothorax court et transversal, surtout chez ♀ ; élytres de la largeur du prothorax, un peu élargis au milieu, finement et densément ponctués; pattes robustes, noires avec les cuisses largement testacées, parfois tibias bicolores; ceux-ci en partie et finement epineux.

Long. 10–11 mill.

MINDANAO, Surigao, Nos. 16166, 16167, 7256, 6681.

Voisin de *T. atricornis* Guer. distinct, à première vue, par sa coloration élytrale.

Tylocerus convexithorax sp. nov.

Oblongo-elongatus, fere opacus, testaceus, antennis pro majore parte oculisque nigris, elytris nigro-piceis, testaceo cinctis et ad basin testaceo maculatis.

Oblong-allongé, presque opaque en dessus, à pubescence, en partie soulevée, grise ou foncée, testacé avec les yeux et antennes noires, ces dernières avec les 2 premiers articles testacés, celles-ci grêles et poilues, à premier article peu gros, arqué, élytres d'un noir de poix, à base et pourtour testacés. Tête petite, fortement creusée entre les yeux; prothorax particulier, convexe, densément et ruguleusement ponctué sur le disque, largement explané sur les côtés qui sont nettement arqués, prolongé subtriangulairement sur le milieu antérieur, sinué postérieurement, étroitement rebordé en avant et en arriére; élytres pas plus larges que le prothorax, courts, courtement rétrécé a l'extrémité, nettement explanés, densément et en partie ruguleusement ponctués avec des vestiges de côtés sur le disque; pattes assez robustes ♀.

Long. 7 mill.

MINDANAO, Surigao, No. 17203.

Espèce à faciès de *Luciola,* distincte entre toutes par sa forme et la structure de son prothorax.

Tylocerus sericeus Pic.

LUZON, Benguet Subprovince, Baguio. MINDANAO, Zamboanga Province, Dapitan, Nos. 17196, 17207, 6045.

Tylocerus bakeri sp. nov.

Elongatus, nitidus, niger, thorace pro parte coxisque testaceis, elytris diverse albo notatis, rare innotatis, abdomine albo marginato. Variat.: thorace testaceo, concolore (var. *obliteratus.*)

Allongé, brillant, à pubescence soyeuse avec les élytres un peu granuleux et hérissés, noir avec les élytres d'ordinaire

marqués de flave sur le disque, ou sur les côtés médians, parfois concolores, prothorax testacé, maculé diversement de foncé sur le disque et en avant (forme type), parfois concolore, testacé (var. *obliteratus*), hanches et parfois la base des cuisses testacées, abdomen foncé, diversement marginé de flave. Tête grande ♂, ou petite ♀; antennes plus longues chez ♂ que ♀, grêles avec le premier article épais ♂, noires, sommet du dernier article roussâtre; prothorax court et modérément large, un peu élargi postérieurement; élytres pas plus larges que le prothorax, sinués sur les côtés, assez longs, parfois plus brillants et plus foncés chez ♀; pattes grêles ♀, ou à tibias un peu aplatés et creusés ♂.

Long. 6–10 mill.

MINDANAO, Bukidnon Province, Tangkulan. LUZON, Mount Maquiling, Mount Banahao, Los Baños, Nos. 154, 1732, 2820. Aussi à Borneo, Sandakan, No. 17192.

Très distinct de *T. sericeus* Pic, par sa forme plus allongée et sa coloration.

Tylocerus discovittatus sp. nov.

Elongatus, nitidus, niger, thorace, illo antice nigro notato, membris et abdomine, pro parte rufis, elytris in disco luteo vittatis.

Allongé, brillant, orné d'une pubescence grise en partie soulevée, noir, base des antennes, partie des pattes et du dessous du corps roux, prothorax roux-testacé, maculé de foncé sur son milieu antérieur; élytres noirs, à reflets un peu métalliques avec une bande discale jaune élargie postérieurement et éloignée des extrémités. Tête plus étroite que le prothorax; antennes grêles; prothorax court et large, élargi postérieurement; élytres à peine plus larges que le prothorax, peu longs, sinués sur les côtés, finement et densément ponctué; pattes robustes, presque entièrement noires; abdomen foncé, marginé de flave ♀.

Long. 7 mill.

MINDANAO, Bukidnon Province, Tangkulan, No. 17198.

Très distinct du précédent et des suivants par sa coloration élytrale particulière.

Tylocerus invittatus sp. nov.

Oblongo-elongatus, nitidus, niger, thorace circa, femoribus ad basin abdomineque pro parte testaceis, elytris nigris, ad humeros et lateraliter testaceis.

Oblong-allongé, brillant, orné d'une pubescence grise en partie soulevée, noir avec le pourtour du prothorax et de l'abdomen,

la base des cuisses, le calus huméral et les côtés des élytres testacés. Tête robuste, antennes grêles, à premier article épais; prothorax en carré transversal, nettement marginé-relevé sur le pourtour; élytres pas plus larges que le prothorax, assez courts, sinués latéralement, finement et densément ponctués; pattes assez grêles ♂.

Long. 6 mill.

MINDANAO, Zamboanga Province, Dapitan, No. 17197.

Voisin de *T. distinctipennis* Pic, en diffère, en plus de la coloration, par le prothorax non subangulé postérieurement sur les côtés et le 1er article des antennes plus èpais.

Tylocerus vittigerus sp. nov.

Oblongo-elongatus, nitidus, niger, thorace circa, femoribus ad basin abdomineque pro parte testaceis; elytris nigris, in disco lateraliter medio et apice luteo-testaceo notatis.

Oblong-allongé, brillant, orné d'une fine pubescence grise, noir, parfois à reflets un peu métalliques par places, pourtour du prothorax, partie de l'abdomen et base des cuisses testacés, élytres à bande discale obliterée postérieurement, bord latéral median et sommet d'un jaune testacé. Tête assez robuste, antennes grêles, a 1er article épais, taché de testacé à la base; prothorax en carré transversal, nettement marginé-relevé sur le pourtour; élytres pas plus larges que le prothorax, assez courts, sinués latéralement; finement et densément ponctués; pattes assez grêles, ♂.

Long. 7 mill.

LUZON, Benguet Province, Baguio, No. 17193.

Voisin du précédent, s'en distingue, à première vue, par la bande claire discale des élytres.

Synopsis des espèces de Tylocerus.

1. Prothorax non bombé sur le disque et brillant; élytres à pubescence soyeuse; pattes plus ou moins foncéees ..... 2.
   Prothorax bombé sur le disque et mat; élytres sans reflets soyeux; pattes testacées, robustes ..... **T. convexithorax** sp. nov.
2. Premier article des antennes ♂ moins long, ou moins épais; moyennes ou petites espèces; prothorax non entièrement testacé, d'ordinaire largement noir ..... 4.
   Premier article des antennes ♂ long et épais; assez grandes espèces; prothorax entièrement testacé ..... 3.
3. Elytres foncés, plus ou moins bordés de flave ..... **T. mindanaonus** sp. nov.
   Elytres testacés, maculés de noir au sommet. Pattes plus ou moins foncées avec la base des cuisses testacée (forme type), ou testacées avec les genoux et tarses foncés (var. *cumingi* Pic).
   T. atricornis Guer.

4. Prothorax bicolore, noir et testacé; élytres d'ordinaire marqués de flave ou de testacé..... 5.
   Prothorax entièrement foncé ainsi que les élytres et le reste du corps. T. sericeus Pic.
5. Prothorax noir, bordé de clair; élytres longuement bordés de clair..... 7.
   Prothorax testacé, plus ou moins marqué de noir sur son milieu antérieurement, rarement presque concolore, testacé; élytres non bordés, ou seulement brièvement clairs sur le milieu des côtés..... 6.
6. Elytres noirs, brièvement marqués de flave (et diversement) sur le milieu discal; des poils dressés nets. Parfois la macule flave s'oblitère ♀..... T. bakeri sp. nov.
   Elytres noirs à reflets métalliques, à longue bande discale testacé-jaunâtre un peu dilatée postérieurement, eloignée des extrémités; pas de poils dressés nets..... T. discovittatus sp. nov.
7. Elytres sans bande discale testacée; épaules tachées de clair (par l'élargissement de la bordure claire)..... T. invittatus sp. nov.
   Elytres avec une bande discale testacée; épaules noires. T. vittigerus sp. nov.

Polemiosilis semibrunnescens sp. nov.

Parum elongatus, nitidus, rufo-testaceus, membris elytrisque pro parte brunnescentibus.

Peu allongé, brillant, orné d'une pubescence grise avec quelques poils courts, relevés, roux-testacé avec partie des membres et élytres en majeure partie rembrunis. Tête grosse avec les yeux, qui sont noirs, plus large que le prothorax; antennes assez épaisses, à articles médians un peu échancrés et subdentés au sommet, foncées avec la base rousse; prothorax peu large, arqué en avant, peu rétrécé en arrière; élytres nettement plus larges que le prothorax, peu longs, subsinués latéralement, peu densément ponctués, en partie ruguleux, ces organes sont roux à la base, rembrunis sur le disque avec l'extrémité plus foncée; dessous du corps testacé avec l'abdomen en partie rembruni, assez courtement bilobé au sommet; pattes testacées, tachées de brun, un peu robustes, ongles non fendus.

Long. 8 mill.

Singapore, No. 17190.

Voisin de *P. testaceicollis* Pic, de la même provenance, s'en distingue, à première vue, par les antennes non robustes et la coloration.

Polemiosilis piceolateralis sp. nov.

Paulo elongatus, subparallelus, nitidus, rufo-testaceus, antennis pedibusque por parte piceis, elytris lateraliter piceo lineatis.

Un peu allongé, subparallèle, brillant, orné d'une pubescence grise en partie soulevée, roux-testacé avec parties des membres et élytres latéralement couleur de poix. Tête grosse avec les

yeux, qui sont noirs, plus larges que le prothorax; antennes peu robustes, à articles intermédiaires un peu élargis et dentés au sommet; foncées avec la base et le dernier article testacés; prothorax court et assez large, arqué en avant, presque droit sur les côtés postérieurs; élytres peu plus larges que le prothorax, pas très longs, presque parallèles, densément ponctués et en partie ruguleux, testacés avec une bande longitudinale externe couleur de poix, plus large postérieurement; dessous du corps roux-testacé, abdomen, au sommet, courtement bilobé; pattes brun de poix avec les tibias variablement testacés et les cuisses largement testacées à la base, peu robustes, ongles non fendus.

Long. 7 mill.

LUZON, Laguna Province, Mount Maquiling, No. 152.

Voisin du précédent, s'en distingue, en plus de la coloration différente des élytres, par les antennes moins grêles, et le prothorax plus transversal.

Polemiosilis forticornis sp. nov.

Parum elongatus, nitidus, niger, capite, thorace scutello elytrisque rufis.

Peu allongé, brillant orné d'une pubescence grise en partie soulevée parfois avec quelques petits poils dressés, noir avec le dessus du corps roux. Tête non ♀, ou plus large que le prothorax; antennes robustes, plus ou moins aplaties, plus longues chez ♂ que chez ♀, noires, parfois rousses à l'extrême base, à dernier article roux au sommet; prothorax un peu transversal chez ♀, moins large ♂, arqué en avant, peu rétrécé en arrière; élytres à peine plus larges que le prothorax, assez longs, subsinués latéralement, à ponctuation en partie ruguleuse rapprochée et parfois des traces de costules sur le disque, dessous du corps foncé, abdomen parfois marqué brièvement de roux, lobes latéraux de l'extrémité de l'abdomen ♂ subtriangulaires; pattes noires, parfois marquées de roux à la base des cuisses, assez robustes, ongles non fendus.

Long. 8–10 mill.

MINDANAO, Agusan Province, Butuan, Nos. 17170, 17172, 17168, 17173.

Très distinct des espèces précédentes par les antennes plus fortes, aplaties et les élytres concolores.

Polemiosilis proximus sp. nov.

Parum elongatus, nitidus, niger, capite, antennis apice, thorace, scutello elytris femoribusque ad basin rufis.

Peu allongé, brillant, orné d'une pubescence grise en partie soulevée, avec quelques petits poils dressés, noir avec le dessus du corps et la base des cuisses plus ou moins roux, antennes noires à dernier article ♀, ou deux derniers ♀, testacés, lobes latéraux de l'extrémité de l'abdomen, chez ♂, arrondis.

Long. 8–9 mill.

MINDANAO, Agusan Province, Butuan, Nos. 17169, 17178.

Ressemble au précédent par la forme et la coloration, en diffère par la coloration plus claire de l'extrémité des antennes et la structure abdominale du ♂.

. Synopsis des espèces de Polemiosilis.

1. Elytres entièrement testacés, ou en partie rembrunis..... 2.
   Elytres entièrement noirs. (Singapore.)..... **P. testaceicollis** Pic.
2. Elytres entièrement testacés..... 4.
   Elytres marqués de brun..... 3.
3. Elytres largement rembrunis sur le disque. (Singapore.)
   P. semibrunnescens sp. nov.
   Elytres ayant seulement une bande latérale brune.
   P. piceolateralis sp. nov.
4. Lobes latéraux de l'extrémité de l'abdomen ♂ subtriangulaires; dernier article des antennes tout noir, ou un peu roux au sommet.
   P. forticornis sp. nov.
   Lobes latéraux de l'extrémité de l'abdomen ♂ arrondis; deux derniers articles des antennes ♂ et dernier ♀ testacés..... **P. proximus** sp. nov.

Le synopsis ci-dessus, avec les espèces des Iles Philippines, comprend 2 espèces de Singapore des chasses de Baker.

Allocotomosilis inapicalis sp. nov.

Parum elongatus, parum nitidus, rufo-testaceus, membris pro parte brunneo piceis, pro parte rufis, antennis ad basin depressis, apice gracilibus, articulis 7–8 difformibus.

Peu allongé, un peu brillant, pubescent de jaune, la pubescence en partie soulevée sur les élytres, roux testacé, membres en partie roux-testacé, en partie brun de poix. Tête assez grosse, yeux noirs, trés saillants; antennes robustes à la base, à articles 3 à 6 déprimés, 6e creusé en dessus, 4 derniers grêles, 7e article plus clair, incurvé et muni de deux lobes dont un plus court et un peu crochus, 8e article un peu creusé et bidenté en dedans; prothorax court et large, sinué latéralement, un peu échancré près de la base, angles antérieurs saillants en dehors; élytres à peine plus larges que le prothorax, pas très longs, subparallèles, à ponctuation ruguleuse, dense; pattes grêles, foncées avec la

base des cuisses testacé; dessous du corps testacé avec l'abdomen en partie foncé et en forme de trident au sommet ♂.

Long. 8 mill.

BORNEO, Sandakan, No. 17181.

Diffère de *A. depressicornis* Pic par les élytres concolores et la conformation un peu differente du 7e article des antennes.

Silis particularicornis sp. nov.

Parum elongatus, nitidus, testaceus, elytris apice nigris, antennis pro parte brunneis, articulis 4 et 5 dilatatis, subglobulosis, 7° elongato, longe impresso.

Peu allongé, brillant, pubescent de gris, la pubescence étant en partie soulevée sur les élytres, testacé, un peu roussâtre par places, avec les yeux et le sommet des élytres brièvement noirs, les antennes rembrunies sur leur milieu et plus claires à l'extrémité qu'à la base. Tête assez grosse; antennes particulières, à 1er article long et épais, 2e mince et court, 4 et 5 épaissés et subglobuleux, suivants longs avec les 6 à 8 un peu plus épais que les derniers, le 8e étant longuement impressionné au sommet en dessus; prothorax court et large, dilaté vers le milieu, un peu entaillé postérieurement, à angles antérieurs et postérieurs saillants près d'une petite échancrure; élytres à peine plus larges que le prothorax, pas trés longs, subparallèles, à ponctuation ruguleuse dense; pattes assez grêles, testacées, tibias antérieurs en partie, tarses antérieurs et genoux rembrunis.

Long. 8 mill.

BORNEO, Sandakan, No. 17179.

Peut se placer prés de *S. notaticornis* Pic, trés distinct par la structure de ses antennes.

Silis cordicollis sp. nov.

Elongatus, nitidus, testaceus, oculis nigris, antennisque pro parte brunneis.

Allongé, brillant, orné d'une pubescence grise en partie soulevée, testacé avec les yeux noirs et les antennes brunes avec les premiers et les derniers articles testacés. Tête grande, avec les yeux, plus large que le prothorax; antennes longues et assez grêles; prothorax particulier, plus long que large, un peu cordiforme, fortement élargi et subarrondi antérieurement, arqué en avant, rétrécé-étranglé postérieurement avec les angles postérieurs trés saillants, orné d'une forte impression de chaque côté antérieurement et d'une autre médiane sur la base; élytres

bien plus larges que le prothorax, longs, subparallèles, médiocrement et en partie ruguleusement ponctués; pattes longues et grêles, un ongle des tarses fendu; abdomen entaillé-lobé au sommet et muni d'un crochet médian.

Long. 10 mill.

MINDANAO, Surigao, No. 17175.

Espèce distincte entre toutes par la structure de son prothorax.

Silis minimus sp. nov.

Elongatus, subparallelus, nitidus, testaceus, oculis et antennis ad medium late nigris.

Allongé, subparallèle, brillant, pubescent de jaune, la pubescence étant en partie soulevée, testacé, yeux et milieu des antennes largement noirs. Tête large; antennes grêles, poilues; prothorax court et large, sinué sur les côtés, non rétrécé en avant; élytres à peine plus larges que le prothorax, assez longs, subparallèles, à ponctuation dense en partie ruguleuse; pattes assez grêles.

Long. 4.5–5 mill.

BASILAN. MINDANAO, Surigao, Nos. 17176, 17177. Peut se placer près de *S. subrecticollis* Pic, distinct, à première vue, par les antennes en partie foncées, le prothorax plus droit sur les côtés, etc.

Silis bakeri sp. nov.

Elongatus, subparallelus, nitidus, rufo-testaceus, oculis, antennisque nigris, his ad basin rufis.

Allongé, subparallèle, brillant, pubescent de jaune, la pubescence étant en partie soulevée, roux testacé avec les yeux et les antennes, moins leur base, noirs. Tête large; antennes grêles, poilues; prothorax court, pas très large, subarqué en avant, nettement élargi en avant chez ♂, ou muni d'un pli antérieur ♀; élytres un peu plus larges que le prothorax, assez longs, subparallèles, à ponctuation pas très dense et en partie ruguleuse; pattes assez grêles.

Long. 6 mill.

MINDANAO, Surigao, Nos. 17187, 17188.

Très distinct du précédent par la forme de son prothorax, qui le rapproche des suivants, ainsi que par la coloration des antennes.

J'attribue à cette espèce, comme variété, sous le nom de var. *breveapicalis*, deux exemplaires à coloration générale du dessus plus claire, avec les élytres flaves, brièvement marqués de foncé à l'extrémité; ils proviennent du Mont Banahao.

Silis bukidnonus sp. nov.

Elongatus, nitidus, oculis, antennis, articulo 1° rufo excepto, abdomine pro parte, tarsis et elytris apice late nigris.

Allongé, brillant, orné d'une pubescence grise en partie soulevée, roux-testacé avec les yeux, les antennes moins leur base, les tarses, partie de l'abdomen et partie postérieure des élytres noirs. Tête large; antennes grêles et poilues; prothorax court et large, nettement élargi en avant ♂, ou muni d'un pli antérieur ♀; élytres un peu plus larges que le prothorax, assez longs, subparellèles, à ponctuation pas trés dense, en partie ruguleuse; pattes assez grêles.

Long. 7–8 mill.

La var. *banahaonus*, du Mont Banahao, a les élytres de coloration générale foncée, ou brièvement roux à la base.

MINDANAO, Bukidnon Province, Tangkulan: Cotabato Province, Kolumbugan, Nos. 17206, 17205, 17204.

Voisin du précédent avec les élytres largement, ou presque complètement, foncés.

Silis dilaticollis sp. nov.

Elongatus, nitidus, testaceus, oculis, antennis, pedibus pro majore parte, infra corpore pro parte elytrisque nigris, his ad basin parum late testaceo-notatis.

Allongé, brillant, pubescent de gris avec des poils redressés, testacé avec les yeux, les antennes, les pattes, moins une partie des cuisses, le dessous du corps en partie et les élytres noirs, à base peu largement maculée de testacé. Tête large, antennes un peu robustes; prothorax court, fortement dilaté subanguleusement en avant ♂, impressionné au milieu; élytres un peu plus larges que le prothorax, assez courts, à ponctuation peu distincte, en partie ruguleux; pattes pas très grêles.

Long. 6 mill.

LUZON, Mount Maquiling, No. 2399.

Distinct, à premiére vue, de l'espèce précédente par la structure de son prothorax qui chez ♂ est bien plus élargi en avant.

Aux espèces des Iles Philippines j'ajoute, dans le synopsis suivant une espèce nouvelle, originaire de Borneo, découverte par Baker.

Synopsis des espèces de Silis.

1. Prothorax relativement court ou large; élytres moins longs..... 2.
   Prothorax plus long que large, fortement élargi en avant; élytres très longs..... S. **cordicollis** sp. nov.

2. Prothorax plus ou moins fortement dilaté-élargi en avant ♂, ou muni antérieurement d'un repli saillant ♀; antennes plus ou moins foncées, à base parfois rousse..... 4.
   Prothorax non élargi en avant, incisé au milieu, ou postérieurement, chez ♂; antennes testacées, rembrunies ou noires au milieu..... 3.
3. Assez grande espèce à élytres brièvement noirs au sommet; antennes robustes, tricolores, roussâtres à la base, testacées à l'extrémité avec les articles 5–6 rembrunis. (Borneo.)..... **S. particularicornis** sp. nov.
   Petite espèce à élytres concolores, testacés; antennes assez grêles, largement noires au milieu..... **S. minimus** sp. nov.
4. Elytres plus ou moins foncés, tout au moins foncés a leur extrémité.... 5.
   Elytres concolores, entièrement testacés..... **S. bakeri** sp. nov.
5. Elytres presque entièrement foncés, au moins largement foncé à leur extrémité ..... 6.
   Elytres d'un testacé pâle, à sommet brièvement foncé.
   S. b. var. breveapicalis var nov.
6. Prothorax peu fortement dilaté en avant ♂..... 7.
   Prothorax très fortement dilaté en avant ♂..... **S. dilaticollis** sp. nov.
7. Elytres largement marqués de roux-testacé à la base.
   S. bukidnonus sp. nov.
   Elytres foncés, a peine marqués de roux à la base.
   S. b. var. banahaonus var. nov.

Drilosilis robusticornis sp. nov.

Parum elongatus, nitidus, niger, antennis, capite antice, thorace diverse, abdomine pro parte rufo-testaceis, elytris ad suturam testaceo notatis.

Peu allongé, brillant, peu et finement pubescent; noir, devant de la tête, antennes, prothorax en partie et abdomen en partie roux-testacés, milieu des élytres marqués de testacé sur la suture. Tête large; antennes robustes, largement et courtement flabellées; prothorax roux, noir au milieu ou en avant, court et large, étranglé sur la base, lobé et denté sur les côtés postérieurs; élytres un peu moins larges que le prothorax, pas trés longs, subparalléles, finement et en partie ruguleusement ponctués; pattes robustes, foncées avec les cuisses en partie flaves ♂.

Long. 6 mill.

MINDANAO, Bukidnon Province, Tangkulan: Surigao, Nos. 17200, 17208.

Espèce très distincte par ses fortes antennes testacées; peut prendre place près de *D. rubrithorax* Pic.

Drilosilis suturalis sp. nov.

Parum elongatus, nitidus, niger, thorace rufo, abdomine pro parte et elytris ad suturam flavis.

Peu allongé, brillant, peu et finement pubescent, noir avec le prothorax roux, l'abdomen en partie flave, les élytres ornés

d'une macule suturale flave pouvant s'oblitére. Tête large; antennes robustes, en partie longuement pectinées; prothorax court et large, sinué sur les côtés, élargi en avant, angles postérieurs saillants derrière une petite échancrure; élytres à peu près de la largeur du prothorax, pas très longs, subparallèles, finement et en partie ruguleusement ponctués; pattes robustes, presque entièrement foncées ♀.

Long. 8 mill.

MINDANAO, Iligan, No. 17201.

Diffère, à première vue, du précédent, par la coloration foncée des antennes.

Les espèces qui suivent rentrent dans le groupe des Malthinini et sont nettement caracterisées par la brieveté des élytres, ces organes très courts étant longuement débordés par les ailes et l'abdomen, tandis que les espèces qui précédent, rentrant dans le groupe des Cantharini, ont les élytres normaux, non raccourcis.

L'étude des insectes de ce groupe est assez délicate parce que souvent on a affaire à des sujets plus ou moins déformés par la dessication, ou encore parce que l'on ne distingue pas assez bien certains de leurs organes importants.

Ayant l'intention d'étudier les Malthinini d'une façon complète dans un article, qui paraitra ultérieurement, et comprendra quelques espèces étrangéres aux Philippines, je me contenterai donc de donner ici l'énumération des espèces recueillies par Baker, avec les diagnoses préliminaires des formes jugées nouvelles et dont je donnerai plus tard une description complète.

Ichthyurus scripticollis Frm. et var.

MINDANAO, Iligan et Dapitan, Nos. 17163, 17164.

Ichthyurus bakeri sp. nov.

Elongatus, pro parte niger, pro parte flavus aut rufus; thorace flavo, ad medium transverse nigro fasciato; elytris flavis, lateraliter nigro lineatis et ad basin nigro fasciatis; pygidio rufo, in mare profonde inciso et longe bicaudato.

Long. 8–10 mill.

MINDANAO, Surigao. LUZON, Mount Banahao, Nos. 17166, 17167, 6674.

Très voisin de *I. scripticollis* Frm. distinct, à première vue, par le pygidium roux et de forme différente ♂, la bande transversale noire des élytres non prolongée jusqu'à la suture.

Ichthyurus bimaculatus sp. nov.

Elongatus, rufus, capite postice vage, antennis pro majore parte, 4 tibiis et tarsis anticis abdomineque pro parte nigris; thorace transverse nigro multimaculato; elytris rufis, lateraliter medio nigro lineatis et ad suturam antice nigro maculatis; pygidio late rufo, parum robusto, apice triangulariter inciso.

Long. 10 mill.

MINDANAO, Dapitan, No. 17165.

Espèce voisine de la précédente, très distincte par ses dessins noirs élytraux particuliers.

? Ichthyurus pilicornis sp. nov. ♀.

Satis, robustus, nitidus, luteo-testaceus, oculis antennisque, articulis primis exeptis, nigris, his pro parte opacis et dense pilosis, ad medium crassioribus; pygidio lato, apice mediocre et late, subarcuate inciso.

Long. 8 mill.

LUZON, Mount Limay, No. 8269.

Je range dubitativement cette espèce dans le genre *Ichthyurus* Westw., et près de *I. pallidus* Gestro, en attendant d'en connaitre le ♂. Très caractérisé par sa coloration générale claire jointe à sa structure antennaire.

Microichthyurus atripennis sp. nov. ♀.

Latis robustus, subnitidus, niger, capite, thorace et abdomine antice lateraliter flavo notatis; antennis pilosis, filiformibus, nigris, ad basin paulo rufescentibus; capite medio flavo bilineato; thorace breve et lato, in disco flavo lineato, antice ad medium flavo marginato, elytris brevibus, atris, pygidio satis valido, apice breve subtriangulariter inciso.

Long. 5 mill.

LUZON, Mount Maquiling, No. 6042.

Peut se placer près de *M. robustus* Pic, s'en distingue, à première vue, par les élytres concolores et l'avant-corps moins robuste.

Microichthyurus bicoloripennis sp. nov.

Parum elongatus, nitidus, testaceus, pro parte brunnescens, capite valido, thoraceque nigris, elytris brunnescentibus, apice testaceis; pedibus testaceis, pygidio brunnescente, lato, breve subtriangulariter inciso.

Microichthyurus bicoloripennis var. baguionus var. nov.

Capite et thorace brunnescentibus, elytris fere concoloribus.

Long. 4.5–5 mill.

LUZON, Benguet Subprovince, Baguio, Nos. 2398, 10181.

Diffère, à première vue, du précédent par les élytres non foncés, plus pâles à l'extrémité.

Tripherus bakeri sp. nov.

Elongatus et angustatus, nitidus, niger, antennis ad basin, thorace circa, pedibus pro parte et abdomine circa testaceis, elytris testaceis, concoloribus (forma typica), aut ad medium brunnescentibus et thorace nigro (var. *atrithorax*); pygidio angustato, apice minute inciso ♂, aut validiore et subtriangulariter inciso ♀.

Long. 10–12 mill.

MINDANAO, Zamboanga Province, Dapitan. BASILAN, Nos. 8278, 17161, 17162.

Espèce caractérisée par sa forme allongée, jointe à sa coloration.

Genus **FALSOMALTHINUS** novum

Capite validissime, thorace valde latiore, illo elongato, subparallelo; elytris thorace latioribus, brevibus, apice paulo dehiscentibus; abdomine apice simplice, non furcato.

Genre voisin de *Malthinus* Latr., dont il se distingue, à première vue, par la tête excessivement large et les élytres raccourcis.

Falsomalthinus pallidus sp. nov.

Elongatus, nitidus, pallidus, oculis nigris.

Long. 4–5 mill.

BASILAN, No. 7296. Aussi Borneo (coll. Baker et Pic).

HEIGHT, WEIGHT, AND CHEST MEASUREMENTS OF MONGOLIAN PEOPLES, WITH ESPECIAL REFERENCE TO SOUTHERN CHINESE

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Comparatively little has been done in the anthropometry of the Mongolian peoples. During the past few years, in connection with several other investigators in China, I have been recording the height, weight, and chest measurements of normal Chinese men. In writing down these data, I have undertaken to gather together the available material bearing on this subject for the various divisions of the Mongolian stock.

According to Hrdlicka(10) the Mongolians proper, though belonging to the great yellow-brown race, are a mixture of various local and even some western ethnic elements; while the Chinese "present in the main a people that has undergone to a very perceptible degree its own differentiation, so as to constitute a veritable great subtype of the yellow brown stem."

Deniker(3) declares that it is hard to say that there is only one race among the Mongols. There are two varieties: the Tungus, or northern Mongolians, with oval or round faces and prominent cheek bones, are spread over Manchuria, Korea, North China, and Mongolia; the southern Mongolians with lozenge-shaped or square faces and the cheek bones laterally enlarged, are found especially in South China and in Indo-China. The Yeniseians, called Tatars by the Russians, are not Mongolian. The Ainus are a group by themselves, different from all other peoples of Asia. They form a distinct factor in the Japanese race.

The Mongols proper are composed of three groups: the western Mongols, or Eleuts, or Kalmuks; the Torgoots in Zungaria; and the people of northwestern Mongolia (in this group are also included the Ala Shan and Kuku-nor tribes).

Eastern Mongols are found in Mongolia proper. In the south are the Tumets, Shaakars, and in the north, the Khalkas. The Buriats are sprung from the Khalkas.

The Thibetans are not all Mongolian. There is great variation in type. They include the Lolo and Miaotze people of China.

In eastern Asia Deniker(4) says there are three nations of mixed origin, namely:

1. The Chinese composed of five or six elements. Those of the south belong to the southern Mongolian race and are short. Those of the north are tall.

2. The Koreans are a mixture of Tungus, Indonesian, and Japanese. They are taller.

3. The Japanese are short. They are made up of crossings of the northern and southern Mongolian races with Indonesian or even Polynesian elements. The Ainu influence is seen in northern Japan.

Ivanovsky(15) speaks of the small amount of work that has been done on the anthropological study of the people of Asia. He concludes that there are eight anthropological groups in Asia, four of which are the South Chinese, Japanese, Ainus, and Mongols.

HEIGHT OF MONGOLIAN PEOPLES

Modern writers generally refer to the data given by Quetelet(26) as among the earliest that can be depended upon. Thus Topinard,(31) quoting that author, says that the height of man is about 1 meter at 5 years of age. At 15, it is 150 centimeters, and he grows 1.5 centimeters after he is 19 years old. The maximum height is reached at various ages, usually at 30 years. After 50 or 60 the height diminishes. By consulting tables of height according to age, however, it is noticeable that there is but little increase after the age of 18 years.

Gaup,(5) from a study of two hundred twenty Chinese children of both sexes in Peking, noted a marked cessation of growth in the fourteenth to the sixteenth year.

According to Hagen,(8) there was very slight growth in South Chinese after the twenty-fifth year.

In Mongols, according to Ivanovsky,(14) growth does not cease before the thirtieth year.

In Japanese soldiers, according to Koganei,(17) growth is not quite complete at the age of 24, but Miwa(25) says that the greatest height of Japanese occurs in the thirtieth year.

Misawa(24) makes the statement that most anthropologists claim that growth ceases at 17 years for all races except the white race. The mean average height of the entire population

of the globe is put by Topinard(31) at 165 centimeters and by Quetelet(26) for Europeans at 165 to 167.5 centimeters.

By far the most comprehensive study that I have seen of the height of the human species is presented by Martin;(21) he divides mankind into the small, the medium, and the large groups. In the first are individuals averaging 159.9 centimeters or less; in the second group are those of 160 and 169.9 centimeters; and the third includes all races in whom the male averages in height 170 centimeters or more. The tallest recorded people is the Sara tribe of Africa, averaging 181.7 centimeters, and the shortest people, the Pygmies of Mawambi in Africa, whose height averages only 140.8 centimeters.

Topinard(31) says of the stature of men in Asia that, in general, they are short and below the mean. Stature diminishes in the north in Siberia, and in the south approaching the Malay Peninsula; the height increases in the central portion of Asia, in the Japanese Islands, in China, and toward the Himalaya Mountains and Turkestan.

According to Ivanovsky,(15) it is generally believed that the main factors which influence height are race and heredity. However, there is no doubt that insufficient nourishment plays an important part in retarding growth. Social conditions, also, and hard muscular exertion have an important bearing on the question. He also states that the progeny of young mothers are shorter. Thus he cites the Japanese as being small because their women are married at the age of 11 or 12 years. Nevertheless, it remains true that stature is one of the most important of the data that go to make up the characteristics of race or tribe.

In considering the height of the Mongolian race, I shall take up the various divisions and compare the measurements of various investigators.

Beginning in the west, I shall consider the tribes of Chinese Turkestan, Thibet, Mongolia, and Manchuria and the aborigines of China; then the Ainus, Japanese, and Koreans. Next in order I shall consider the inhabitants of Indo-China and, finally, shall study the Chinese themselves, first the northern and southern divisions and, lastly, the classification according to provinces.

Sir Aurel Stein(29) determined the heights of more than six hundred individuals representing twenty-four tribes in eastern Turkestan and the Pamirs, besides twenty Chinese tribes who had emigrated from China. The westernmost tribe was

TABLE 1.—*Heights and weights of the different divisions of the Mongolian race.*

Region, tribe, or province.	Reference.	Class or occupation.	Age.	Average height.	Number in height series.	Average weight.	Number in weight series.	Weight-for-height index.
			yrs.	*cm.*		*kg.*		
Various tribes in eastern Turkestan	Stein (29)		(a)	164.9	600			
Chinese emigrants to eastern Turkestan.	do		(a)	166.7	20			
Kirghizens	Ivanovsky, quoted by Martin (21)			165.1				
Thibetans	Troll		(a)	165	37			
Do	Risley		(a)	163.3	105			
Do	Delisle		(a)	167.3	11			
Do	Montegazza		(a)	157.7	2			
Average (Thibetans)	All quoted by Ivanovsky (15).		(a)	164	155			
Aborigines:								
Formosans	Torii, quoted by Martin (21)			160.5				
Lolos	Legendre (19)		(a)	167.5	29			
Miaotze	Ryuzo-Torii, quoted by Martin (21)			155				
Mongols:								
North Chinese	Talko-Hryncewicz (30)	Merchants in northern Mongolia.	21–55	164.24	54			
Buriats (Trans-Baikal)	do			163.12	544			
Mongol Khalkas	do			161.08	36			
Kalmuks	Ivanovsky (14)			162.9	296			
Do	Deniker, quoted by Martin (21)			163.4				
Average (Kalmuks)				163.1				
Mongols, general	Ivanovsky (14)					64.29		
Tungus	Mainoff, quoted by Martin (21)			162.7				
Do	Talko-Hryncewicz (30)			163.8	45			
Do	Jochelson, quoted by Ivanovsky (15)			157.4	22			
Do	do			156.5	52			

Do	do			158.8	9			
Average (Tungus)				159.8				
Manchus	Gaup (5)			171	5			
Do	Ujfalvy, quoted by Ivanovsky (15)			169	8			
Average (Manchus)				170	13			
Ainus	Koganei (16)		20-68	156.7	95	64	3	
Do	Sakaki, quoted by Ivanovsky (15)			158.1	70			
Average (Ainus)				157.4	165			
Japanese	Koganei (17)	Soldiers 1900		162.1	6,279	57.7	6,279	355
Do	do	Soldiers 1901		164.2	7,580	59	7,580	
Do	Koganei, quoted by Ivanovsky (15)			157.7	50			
Do	Deniker (3)			159				
Do	do	Coolies		157				
Do	Indo (13)		29	160.9	774	52.99	3,772	329
Do	Miwa (25)		29	159.6		53.7	37	336
Do	Rozgdestvensky, quoted by Ivanovsky (15)			157.3	19			
Do	Soller, quoted by Ivanovsky (15)			157.8	15			
Do	Weisbach, quoted by Ivanovsky (15)			156.9	12			
Do	Baelz, quoted by Ivanovsky (15)			159	1,727			
Do	do	Students		161.5	53			
Do	do	Laborers		161.9	13			
Do	do			162	4			
Do	Ijima, quoted by Martin (21)					52-56		
Average (Japanese)				159.7		55.5		
Koreans	Koike (18)		20-50	179.9	75	60.73	75	
Do	Migita and Otsuka, quoted by Koganei (17).		20-55	162.5	128	58.1	128	357
Do	Ijima, quoted by Koganei (17)	Soldiers	21-50	163.1	2,518	59.2	594	
Do	Elisseieff, quoted by Koganei (17)			162	10			
Do	Chantre and Bourdaret, quoted by Ivanovsky (15).			161.5	113			
Average (Koreans) [b]				162.2		58.6		

[a] Adults.

[b] Koike's figures not included.

TABLE 1.—*Heights and weights of the different divisions of the Mongolian race*—Continued.

Region, tribe, or province.	Reference.	Class or occupation.	Age.	Average height.	Number in height series.	Average weight.	Number in weight series.	Weight-for-height index.
			yrs.	*cm.*		*kg.*		
Annamites	Breton (1)	From Saigon		157.7				
Do	Girard (6)	do		158.9				
Do	Deniker (3)	In general		158.3				
Do	Paris			156.6	10			
Do	Roux			162	69			
Do	Deniker and Bonifacy	Cochin-China		158.3	21			
Do	Deniker and Laloy	do		156.5	30			
Do	Deniker and Bonifacy	Tongking		158.4	21			
Do	Deniker and Laloy	do		162.7	23			
Do	All quoted by Ivanovsky (15). Mondiére and Bonifacy, quoted by Martin (21).			158.7		51.3		323
Average (Annamites)				158.8				
Cochin-Chinese	Deniker and others, quoted by Martin (21).			157.8				
Do	Girard (6)			157.3	132			
Formosan Chinese	Taniguchi, Sakamoto, and Yamato, quoted by Koganei (17).	Mostly coolies	21–40	161.7	544	50		
Siamese	Weisbach, quoted by Ivanovsky (15)			162.2	8			
Do	Annandale, quoted by Martin (21)			159.9				
Do	Hagen (8)			160.5	2			
Do	Deniker (3)			160.7				
Average (Siamese)				160.8				
Tongkingese	Breton (1)	Hanoi and Haiphong		157.89				
Do	Deniker and Bonifacy, quoted by Martin (21).			158.4				

Do	Girard (6)			159	76			
Average (Tongkingese)				158.3				
Chinese:								
All China	Shoemaker (27)	Students	20	166.5		52.2		
North China	Hagen (7)			167.6				
Do	Koganei (17)	Soldiers	25–66	167.6	942	64.4	942	384
Do	Deniker (3)	Chefu and Kuldja		167.4				
Do	Shoemaker (28)	Peking students		165.3	380	54.3	380	328
South China	Weisbach (32)	Prisoners, etc	20–49	163	26			
Do	Crook (2)	Students	20	166.6	34	51	34	
Do	Girard (6)	Collected data		161.6	1,047			
Do	Deniker (3)	In Longchow		161.5				
Do	Whyte (35)		(a)	163	1,741	50.2		295–335
Anhwei	Hutcheson (12)		(a)	164.6	29	50.8	27	
Chekiang	do		(a)	162.8	258	52.8	259	324
Chihli	Gaup (5)			167				
Do	Hutcheson (12)		(a)	168.9	261	57.3	259	339
Fukien	do		(a)	166.3	5	50.8	5	
Hoklos	Whyte (34)	Convalescent patients	(a)	162.7	1,021	[c] 54.4		
Honan	Gaup (5)			174				
Hunan	Hutcheson (12)		(a)	161.5	267	50.1	354	310
Hupeh	do		(a)	163.5	9	50.8	8	
Hupeh (Wuchang)	Merrins (23)	Students	(a)	168.9		54.2		
Kiangsi	Hutcheson (12)		(a)			51.5	14	
Kiangsu	do		(a)	166.1	709	55.4	696	333
Kwangsi	Girard (6)			161.5	25			
Kwangtung	Breton (1)	Cantonese	22–37	165.8	15			
Do	Hagen (8)	Sumatra coolies	25–60	162.2	15,582			
Do	Cadbury	Students	20–36	163.6	110	51.9	110	317
Do	Hutcheson (12)		(a)	160.7	232	55	203	342
Kweichow	do		(a)	166.6	8	58.9	8	

[a] Adults.

[c] Estimated from the height.

TABLE 1.—*Heights and weights of the different divisions of the Mongolian race*—Continued.

Region, tribe, or province.	Reference.	Class or occupation.	Age.	Average height.	Number in height series.	Average weight.	Number in weight series.	Weight-for-height index.
			yrs.	*cm.*		*kg.*		
Shantung	Koganei (17) quoting Janka	Chefu laborers	17–35	167.5	20			
Do	Gaup (5)			173				
Do	Hutcheson (12)		[a]	167.6	5	54.8	5	
Do	Merrins (23)	Students	[a]	170.2		63.96		
Szechuan	Hutcheson (12)		[a]			49.6	4	
Do	Legendre (20)			161.1	100			
Do	Wilford (33)	Students	[d] 18	166.1	70	45.8	70	

[a] Adults.

[d] Average.

that of the Kafirs of Kafiristan and, farther east, the tribes of the Taklamakan Desert and of Khotan, and other tribes to the north and east. The extremes of height were 160 and 170 centimeters. The average for all the tribes was 164.9 centimeters, while the Chinese emigrants to this region averaged 166.7 centimeters.

Coming now to the Thibetans, I find a classification made by Ivanovsky,(15) who gives the average height as 164 centimeters.

The aborigines of China are closely allied to the Thibetan tribes. I have obtained data for the Formosans and Miaotze (see Table 1). These peoples are confined to the mountains and are of short stature.

Legendre(19) reports on twenty-nine males of the Lolos tribe. These aborigines live in the mountains of southern Szechuan. Their height varied from 156 to 178 centimeters, and the average height was 167.5 centimeters.

Reference has already been made to the distribution of the Mongols in the Chinese Empire. They are also found in the Russian Empire, according to Hrdlička,(11) distributed as follows: European Russia, 0.2 per cent of population; Caucasus, 0.2 per cent of population; Siberia, 6.2 per cent of population; central Asia, 0.2 per cent of population.

Deniker(3) says that the type of the Mongolian race has a stature of 163 to 164 centimeters, with a subbrachycephalic head.

Ivanovsky(14) examined especially members of the Torgout tribe, generally called Kalmuks, in the valley of Kobok Zari, south of Tarbagatai. He concludes that Mongols are of medium size. Of two hundred ninety-six measurements, 34.48 per cent were below 165 centimeters and 64.52 per cent above.

Gaup(5) found the Mongols in Peking to be short. In three cases examined the mean height was 165 centimeters. He did find some, however, who measured as much as 196 centimeters.

Talko-Hryncewicz(30) studied the heights of fifty-four males between the ages of 17 and 55 years. They were North Chinese merchants who had migrated from Siberia to northern Mongolia to the towns of Maimachin and Kyakhta in Urga. Excluding five who were between 17 and 20 years of age, there remained forty-nine adults. The average height of these was 164.24 centimeters. He goes on to show the differences between the maximum and minimum heights of different races as follows:

In these 49 North Chinese, the heights varied from 153 to 172 centimeters; in 25 South Chinese, from 152.8 to 174.8 cen-

timeters; in 544 Buriats, from 135 to 185 centimeters; in 36 Khalkas, from 146 to 175 centimeters; in 45 Tungus, from 146 to 186 centimeters; and in 296 Kalmuks it varied from 151.1 to 175 centimeters.

The differences between maximum and minimum heights were as follows: North Chinese, 19 centimeters; South Chinese, 22; Kalmuks, 23.9; Khalkas, 29; Buriats, 50; Tungus, 40.

In Table 2 is seen the relative proportion of six groups of Mongols found in the different height categories. The greatest proportion of North Chinese belong to the medium-height group, while the South Chinese have the smallest percentage in this group and the largest percentage in the short group. The other Mongol tribes lie between these extremes.

TABLE 2.—*Relative height proportions of six groups of Mongols.*

Height.	49 North Chinese.	25 South Chinese.	296 Kalmuks.	544 Buriats.	36 Mongol Khalkas.	45 Tungus.
cm.						
159 or under	14.2	40	31.75	25.34	33.34	28.89
160 to 169	75.5	51.9	57.10	61.58	58.33	66.67
170 and over	10.2	8	11.15	13.05	8.33	4.44

Several studies of the height of Tungus are recorded in Table 1; they average only 159.8 centimeters. The Manchus are reported by Gaup(5) as averaging 175 to 176 centimeters; he examined five cases which averaged 171 centimeters. The Ainus are different in many respects from the other branches of the yellow-brown races, but must be included here because of their influence upon the Japanese and Koreans.

Koganei(16) has made a study of these people. He measured the heights of 166 persons, 95 men and 71 women. The ages of the men varied from 20 to 68 years, and their average height was 156.7 centimeters. The minimum was 141 centimeters and the maximum 173 centimeters. The majority of the men ranged from 154.5 to 160 centimeters. He quotes Scheube, who measured 6 males with a similar average.

According to Ivanovsky,(15) the Japanese type is a fairly distinct one. The Japanese are characterized by short stature. and do not show close resemblance to any other race. They constitute an independent anthropological group. According to Deniker,(3) they originate from crossings of northern and southern Mongol races, with Indonesian or even Polynesian elements.

Indo,(13) quoted by Koganei,(16) gives the heights of 20,000 males, aged 15 to 60 years. The maximum height reached by

these men occurred at the age of 30. The average at this age is 160.9 centimeters.

Miwa(25) measured 10,490 Japanese of both sexes from birth to 80 years of age. The average height of those of 30 years of age was 159.6 centimeters.

The Koreans, according to Deniker,(3) are a mixture of Tungus, Indonesians, and Japanese. Koike(18) gives the average height as 179.9 centimeters for 75 men measured, and Migita and Otsuka, as 162.5 centimeters. There seems no doubt that Koike's figure is too high, and 162.2 centimeters may be considered a fair average height.

The peoples of Indo-China, while forming a rather distinct type, are nevertheless closely allied to the Mongolian race. In this group there are the Annamites, averaging 158.8 centimeters in height; men from Cochin-China, averaging 157.5; from Siam, averaging 160.8; and from Tongking, averaging 158.3. The averages for all these peoples of Indo-China and Siam puts them in the class of short men.

TABLE 3.—*Average or mean heights of different members of Mongolian race.*

Race or tribe.	Height in centimeters.
Manchus	170
Lolos	167.5
North Chinese	166.97
Chinese in eastern Turkestan	166.7
Kirghizens	165.1
All Chinese	165
Tribes of eastern Turkestan	164.9
Chinese of northern Mongolia	164.24
Thibetans	164
Buriats	163.12
Kalmuks	163.1
South Chinese	163.1
Koreans	162.2
Khalkas	161.08
Siamese	160.8
Formosans	160.5
Tungus	159.8
Japanese	159.7
Annamites	158.8
Tongkingese	158.3
Cochin-Chinese	157.5
Ainus	157.4
Miaotze	155

Having considered the various other branches of the Mongolian race, I come now to a consideration of the Chinese people.

The earliest study that I have been able to find is that of Weisbach,(32) who reports measurements taken of various tribes during the voyage of the frigate *Novara*. The heights were taken by Scherzer and Schwarz, during the ship's stay at Hongkong, of 26 males, 21 of them Puntis and 5 Hakkas. The subjects were found in the prison and hospitals of the city. They were all born in South China. The heights varied from 152 to 174.4 centimeters. Thus, the mean was 163 centimeters, and 30.7 per cent measured from 160 to 164.9 centimeters.

Breton(1) reports on 15 Cantonese, 22 to 37 years of age, who averaged 165.8 centimeters.

Hagen's(7) first report includes the measurements of 1,007 coolies from South China. There was one, a dwarf, measuring only 122 centimeters. The average height was 162.2 centimeters. These data are included in his more comprehensive study(8) of the Chinese people of Deli, in Sumatra. The South Chinese are very numerous there, where they serve as coolies on the great tobacco plantations. They come from Kwangtung Province and are chiefly Hakkas, with a few Hoklos. Hagen has gathered data for 15,582 of these South Chinese. The heights for different age groups are shown in Table 4.

TABLE 4.—*Heights of various age groups of South Chinese.*

Age.	Number examined.	Average height.
Years.		*cm.*
15 to 19	400	158.4
20 to 24	4,375	160.8
25 to 29	4,354	162.1
30 to 34	3,337	162.2
35 to 39	2,046	162.2
40 to 49	1,013	162.3
50 to 60	60	161.5

For those aged 25 to 60 years, the mean height was 162.2 centimeters.

Hagen concludes that the South Chinese demonstrate in their bodily structure that they have a mixture of the Malay race. The North Chinese, on the other hand, who have no Malay characteristics, have almost never traveled in the Malay countries. In a later communication Hagen(9) states that the average height of the North Chinese is 167.6 centimeters. A pure-blooded Chinese from Hainan measured 159 centimeters, and a Fukien Chinese 179 centimeters.

Crook(2) records the measurements of Chinese students at Queen's College in Hongkong. They are presumably all from the south of China. Those aged 20 averaged 166.6 centimeters.

Koganei(17) has contributed a most extensive study on the measurements of Chinese in the north. He measured the heights of 942 Chinese soldiers who were captured during the Chino-Japanese war. These men varied in age from 20 to 66 years (25 who were under 20 years are not included). The majority came from the Provinces of Shantung, Chihli, Honan, Chekiang, Anhwei, and Kiangsu, and from Manchuria. Very few were natives of the other provinces. Thus, practically all may be classed as North Chinese. The average height was 167.6 centimeters, with extreme variations from 148 to 186 centimeters. Among 942 men the percentages of different heights were as follows:

Per cent.	Height in centimeters.
7.3	Under 160
22.1	160 to 165
38.4	165 to 170
32.2	170 and over

Koganei quotes Janka's figures for 20 Chinese laborers in Chefu. These were aged 17 to 35 years, but only 5 of them were under 20. The average height of these was 167.5 centimeters. Koganei also refers to the measurements of 544 Formosan Chinese, mostly coolies, in Tainan. The heights of these averaged 161.7 centimeters.

Girard(6) obtained the heights of 25 Chinese from Kwangsi Province, on the borders of Tongking. Their mean height was 161.5 centimeters, while the maximum was 174.8, and the minimum 152.8. Girard refers to a collection made by Deniker and Laloy of the heights of 1,047 South Chinese. The average for these was 161.6 centimeters.

Deniker(3) gives the measurements of South Chinese of Longchow as 161.5 centimeters, and of North Chinese from Chefu and Kuldja as 167.4 centimeters.

Gaup(5) examined 38 Chinese in Peking, from different provinces; the average height was 167.4 centimeters. Those from Shantung measured 173 centimeters, from Honan 174, from Chihli 167, while those from Shanghai and Ningpo were 163 and 157 centimeters in height. He states that it is generally conceded that the largest Chinese are those from Honan Province, where the first immigration of Chinese took place.

Merrins(23) records the measurements of 219 schoolboys at Wuchang in Hupeh Province. The height of those who had "practically finished growing" was 168.9 centimeters. He also quotes the figures on grown boys at the Shantung Union College, collected by Doctor Roys. These Shantung students averaged 170.2 centimeters in height.

The height of the Hoklo people, inhabiting the southeastern coast of China, has been studied by Whyte.(34) These people are better known as the Swatow men, from the name of the port in Kwangtung Province from which many of them emigrate to other countries. All subjects were males and hospital patients over 17 years of age. There were 1,047 examined. Three-fourths of the cases measured between 157.5 and 167.6 centimeters, the average for all being 162.7 centimeters.

Legendre(20) examined 100 male Chinese from Chengtu, the capital of Szechuan Province. Of these the tallest 30 averaged 168.1 centimeters, the shortest 30, 153.7, while the 40 of medium height averaged 161.4 centimeters.

Shoemaker has taken the heights of students in Tsinghua College in Peking. In his first report,(27) students from all sections of China are grouped together. Those aged 20 years averaged 166.5 centimeters in height. Shoemaker is quoted by Whyte(28) as to the data secured from Peking or North China boys. Of these, 380, who were full grown, averaged 165.3 centimeters in height.

A careful study on behalf of the research committee of the China Medical Missionary Association is contributed by Whyte.(35) In this is included the study of Hoklos mentioned above, making altogether 1,741 adult males. All but 16 of these were from the provinces of Fukien and Kwangtung. For all of these adult males, the average height is 163 centimeters. The greatest number of these South Chinese are found at the point, 162.56 centimeters, in a curve showing number of individuals of a given height.

A second and more comprehensive report of the research committee of the China Medical Missionary Association is edited by Hutcheson.(12) The data for this report were collected by fourteen physicians, most of whom lived in China. Altogether, measurements of 3,143 males and 215 females were collected. Hutcheson finds that heights of Chinese "beginning at Canton increase steadily up to Peking." The measurements of adult coolies are much higher than measurements of students of the same province.

The heights of Chinese from ten provinces are recorded (see Tables 1 and 5).

Wilford(33) has added a few data for students in Chengtu, Szechuan, whose average height was 166.1 centimeters.

TABLE 5.—*Average of mean heights of Chinese males in the different regions of China.*

Region or province.	Height in centimeters.
Honan	174
Shantung	169.6
Chihli	167.9
North China	166.97
Kweichow	166.6
All China (students)	166.5
Fukien	166.3
Hupeh	166.2
Kiangsu	166.1
Anhwei	164.6
Kwangtung	163.78
Szechuan	163.6
South China	163.1
Chekiang	162.8
Hoklos	162.7
Formosa	161.7
Hunan	161.5
Kwangsi	161.5

In addition to the above, I add the measurements of 110 male students of the Canton Christian College, 20 to 36 years of age (see Table 6). The maximum height was 177.2 centimeters; the minimum was 148.6 centimeters, in the one student who was 36 years old. The average height for all the students was 163.6 centimeters.

For age 20 there were 54 recorded. Of these 16.4 per cent were of a height between 152.4 and 160 centimeters; 63.6 per cent were between 160 and 167.6 centimeters; while 20 per cent were from 167.6 to 174 centimeters in height. It will be noted that the average of adult Cantonese men as given by Hutcheson is 2.9 centimeters less than my figures. This is doubtless because students at the Canton Christian College come largely from well-to-do families and have better opportunity for physical development than the average schoolboy of the province. The Cantonese coolies reported by Hagen are also shorter, for the reason that they are not so well nourished.

Comparing now the figures in Table 5, I find that the Chinese vary in height from 174 centimeters in Honan Province to 161.5

TABLE 6.—*Heights, weights, and chest measurements of male Chinese students of the Canton Christian College.*

Age.	Cases.	Height.			Weight.		
		Average.	Maximum.	Minimum.	Average.	Maximum.	Minimum.
Years.		*cm.*	*cm.*	*cm.*	*kg.*	*kg.*	*kg.*
20	54	165.1	174	153	50.3	64.7	42.5
21	26	165.1	177.2	153.6	49.4	57.1	43.1
22	15	167	172.7	159.4	52.6	62.6	44.9
23	5	167	169.5	162.5	50.6	55.2	45.8
24	2	170.8	173.3	169.5	54.8	58.5	51.1
25	1	169.5			62.3		
26	1	168.9			61.3		
27	1	162.5			51.2		
28	0						
29	1	160.6			48.3		
30	1	162.5			46.5		
31	2	156.2	158.1	154.9	52.5	55.9	49
36	1	148.6			43.2		

Age.	Circumference of chest.									Play of chest.
	At full inspiration.			At full expiration.			At rest or mean.			
	Average.	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.	Maximum.	Minimum.	
Years.	*cm.*	*cm.*	*cm.*	*cm.*	*cm.*	*cm.*	*cm.*	*cm.*	*cm.*	*cm.*
20	83	93	75	77	83	69	79	85	70	6
21	80	86	67	74	81	64	75	82	65	6
22	83	89	77	75	82	68	78	85	70	8
23	83	90	79	74	81	74	77	85	76	9
24	83	90	77	78	85	71	81	87	75	5
25	87.5			83			85			4.5
26	87			81			83			6
27	82.5			78			80			4.5
28										
29	83.5			79			80.5			4.5
30	80			71			73			9
31	84.5	89	80	79	85	74	81	87	76	5
36	77			70			75			7

centimeters in Hunan and Kwangsi, the latter on the borders of Indo-China. The average for all Chinese is 165 centimeters, or the average for all mankind as given by Topinard. There is a marked difference, however, between the peoples north and those south of the Yangtze River. Taking all the groups of Chinese given in Table 1, we may divide them into North and

South Chinese. Since the Yangtze River flows right through the Provinces of Szechuan and Anhwei, we shall omit those provinces from the list (see Table 1). The heights, in centimeters, average as follows for the respective groups:

North Chinese:	South Chinese:
167.6	163
167.6	166.6
167.4	161.6
165.3	161.5
167	163
168.9	162.8
174	166.3
163.5	162.7
168.9	161.5
166.1	161.5
	165.8
	162.2
	163.6
	160.7
	166.6

Thus, the general average for the peoples north of the river is 167.6 centimeters, while for the peoples south of the river the height averages 163.2 centimeters.

I may say that in a general way the Mongolian people can be divided into tall (over 165 centimeters), medium (160 to 165 centimeters), and short (under 160 centimeters). In the first group belong the Manchus, the Lolos, and the Chinese of Honan, Shantung, Chihli, Kweichow, Fukien, Hupeh, and Kiangsu, and North Chinese in general. In the medium group are the people of eastern Turkestan, Mongolia, and Thibet, the Buriats, Kalmuks, Koreans, Khalkas, Siamese, and the Chinese of Anhwei, Kwangtung, Szechuan, Chekiang, Hunan, Kwangsi, and Formosa, the Hoklo people, and the South Chinese in general. In the short group are to be classed the Tungus, Japanese, Annamites, Tongkingese, Cochin-Chinese, Ainus, and Miaotze.

WEIGHT OF MONGOLIAN PEOPLES

Weight, as Topinard(31) states, does not have the importance from the anthropological point of view that height does. It depends on too many factors; namely, the state of nutrition, the health and occupation of the individual, etc.

According to Martin,(21) the average weight of Europeans, stripped, is 65 kilograms. Races that are of lower average weight are often found to be poorly nourished. Quetelet(26)

gives 66 kilograms, and McCay(22) considers 70 kilograms as the average for European adult males.

TABLE 7.—*The weights of males of the various groups of the Mongolian race.*

Race, region, or province.	Weight in kilograms.
Mongols	64.29
Ainus	64
Shantung	59.38
North China	59.3
Kweichow	58.9
Koreans	58.6
Chihli	57.3
Japanese	55.5
Kiangsu	55.4
Hoklos	54.4
Kwangtung	53.4
Chekiang	52.8
Hupeh	52.5
Kiangsi	51.5
Annamites	51.3
Anhwei	50.8
Fukien	50.8
South China	50.6
Hunan	50.1
Szechuan	47.7

Ivanovsky(14) gives 64.29 kilograms (157 Russian pounds) as the average weight of Mongols. They vary from 49 to 83 kilograms.

Koganei(16) determined the weight of only 3 Ainu males, who weighed 63, 65.2, and 64 kilograms, giving an average of 64 kilograms.

For the Japanese soldiers Koganei(17) finds an average of 56 to 59 kilograms. For ordinary Japanese, he gives Indo's average for 3,772 persons of 26 to 30 years, as 52.99 kilograms. The greatest body weight occurred in men between 46 and 50 years of age, who averaged 55.57 kilograms. According to Miwa,(25) the greatest weight occurs at 39 and the average of 37 men at this age was 53.71 kilograms. Martin(21) quotes Ijima as giving 52.7 to 56.2 kilograms as the average weight of Japanese.

Coming now to consider the Koreans, I find data again supplied by Koganei.(17) Koike(18) gives the figures for 75 Koreans in Fusan, aged 20 to 50 years. Their weight averaged 60.73 kilograms, but this, as well as Koike's figure for height, seems too high. Migita and Otsuka(17) measured 128, between 20 and 55 years of age, with an average weight of 58.1 kilo-

grams. The average weight of 594 of Ijima's cases, aged 21 to 50 years, was 59.2 kilograms.

The weight of Annamites is given by Martin(21) as 51.3 kilograms, quoting Bonifacy.

Coming now to the Chinese, Koganei(17) found the weight in 942 North Chinese soldiers to average 64.38 kilograms, with extreme variations of 37.5 and 91.5 kilograms. He quotes Taniguchi, Sakamoto, and Yamato as giving the weight of Formosan Chinese as follows:

Age in years.	Weight in kilograms.
21 to 25	49.74
26 to 30	49.87
31 to 35	49.57
36 to 40	50.93

The average for all amounts to 50 kilograms.

Crook's(2) weight for boys in Hongkong, aged 20 years, was 51 kilograms. Merrins's(23) records are for schoolboys who had finished growth, at a school in Wuchang, Hupeh, and also grown students at Shantung.

Whyte,(34) in his study of the Hoklos, emphasizes the influence of height on the weight of these people and, since some of these subjects were suffering from disease, I have estimated the weight from the average height according to Whyte's rule (see page 752).

My own study of weights of Chinese students is shown in Table 6. I have assumed that increase of growth in height has practically ceased at 20 years of age. The average weight of those of 20 years or over is 51 kilograms. In order to determine the frequency of occurrence of different weights, I may select the subjects of 20 and 21 years of age, of whom 80 were recorded. The weights of these were distributed as follows:

Kilograms.	Per cent.
42 to 46	22.2
47 to 50	24.7
51 to 54	29.6
55 to 59	18.5
60 to 65	5.0

More than half weighed between 47 and 54 kilograms. These figures correspond closely with Crook's average for students and with Whyte's figures.

Hutcheson's figures for Kwangtung are higher, and he doubtless included more mature men.

Now, grouping the Chinese north and south of the Yangtze River, excluding Anhwei and Szechuan, as in the study of height, we find the following weights in kilograms:

North of Yangtze:	South of Yangtze:
64.4	58.9
63.9	55
57.3	54.4
55.4	52.8
54.8	51.9
54.3	51.5
54.2	51
50.8	50.8
	50.2
	50.1

North of the Yangtze, then, the average weight is 56.9 kilograms, while south of the river it is 52.6 kilograms.

The Chinese are considerably inferior in weight to all European and American peoples.

The Mongols, Ainus, and Koreans are heavier than the average Chinese.

The Japanese stand between the Chinese of the north and south, while the Annamites, and doubtless the other peoples of Indo-China, weigh considerably less than even the South Chinese.

HEIGHT-TO-WEIGHT RATIO

Martin(21) emphasizes the value of this factor for grown as well as for growing individuals.

Whyte(35) refers to the value of the weight-for-height index, obtained by dividing the weight in grams by the height in centimeters. In England he says that this varies from 402 to 447 or even 536 grams for every centimeter of stature.

From his study of the people of Swatow, Whyte gives the following rule for determining the standard weight for the height:

Deduct 24 from the number of inches representing height and multiply the result by 3, which gives the number of pounds that the individual should weigh.

Broca's rule is to deduct 100 from the height in centimeters and call the remainder kilograms. If this is diminished by 20 per cent, it may be found of value for people in South China.

The weight-for-height index of Chinese in North China is 329 grams, and for South China 313 grams, for each centimeter.

Reference can be made to Table 1, where the weight-for-height index is given in a few instances. For the Chinese soldiers, it

amounted to 384, but for Chinese in civil walks of life it averaged only from 310 to 342.

For Japanese soldiers we get an index of 355 and for ordinary persons, according to Indo's figures, 329 and, according to Miwa, 336. For Koreans, 357 is the index, and for Annamites 323. Thus, for all these Mongolian peoples, the weight-for-height index is below the European standard due, doubtless, to the undernourished condition of the people.

CHEST CIRCUMFERENCE IN MONGOLIAN PEOPLES

Topinard(31) has noted the fact that European races have not only a greater circumference of the chest, but a greater play of the chest between inspiration and expiration.

Ivanovsky's(14) average for chest circumference of Mongols is 86 centimeters, with a minimum of 80 and a maximum of 99.

Talko-Hryncewicz(30) measured the chests of 43 North Chinese merchants from northern Mongolia. For these the average was 81.4 centimeters with a minimum of 70 and a maximum of 98. In 69.7 per cent the chest measured from 75 to 85 centimeters. He gives also the data for other Mongolian tribes (see Table 8). Thus, the chest measurements of the North Chinese are 5 to 6 centimeters smaller than those of the Khalkas, Buriats, and Tungus.

The relative percentage of chest circumference to height of these North Chinese is 49.6, varying from 42.77 in one case to about 55 in the largest case. In Table 8 is given the relative percentage for the other Mongolian tribes, showing that these have chests with a circumference more than half the height. He finds that the chest circumference is relatively greater, as compared with height, in the years between 26 and 30, but is relatively smaller from 31 to 35 years, and also at other ages.

Comparing his figures with those obtainable for other tribes in the Orient, he finds that the latter peoples have a chest circumference greater than one-half the height. Hence, he concludes that in shorter people there is apt to be a relatively greater chest circumference.

Koganei(16) in his study of the Ainus found the average circumference of the chest in males to be 90.4 centimeters, with extremes of 81 and 105.5 centimeters. For Japanese, Koganei(16) quotes Baelz (see Table 8). Koganei(17) also gives the circumference of the chest in Japanese soldiers. These are divided into four groups for the years 1900 and 1901. For the former the average of 6,279 was 85.5 centimeters, and the excur-

TABLE 8.—*Chest measurements of the different divisions of the Mongolian race.*

Region, tribe, or province.	Reference.	Class or occupation.	Age.	Circumference of chest.			Play of chest.	Chest circumference to height.
				At rest.	Inspiration.	Expiration.		
			Years.	*cm.*	*cm.*	*cm.*	*cm.*	*Per cent.*
Mongols:								
North Chinese	Talko-Hryncewitz (30)	Merchants	21–55	81.4				49.6
Buriats	do			88				53.84
Mongol Khalkas	do			87.2				54.01
Tungus	do			86.4				53
In general	Ivanovsky (14)			86				
Ainus	Koganei (16)		20–68	90.4				57.7
Japanese	Koganei (17)	Soldiers 1900		85.5			7	
Do	do	Soldiers 1901		85.7			7.2	52
Do	Baelz, quoted by Koganei (16)	Gentlemen		76.8				47.4
Do	do	Students		77.6				48
Do	do	Laborers		85.2				52.6
Koreans	Koike (18)			83.1			5.7	
Do	Migita and Otsuka, quoted by Koganei (17).		20–55	85			6.3	50.3–53.5
Do	Ijima, quoted by Koganei (17)	Soldiers	21–50	80.8			5.6	49.5
Siamese	Hagen (8)			84.5				
Tongkingese	Breton (1)			79.46				50.4
North Chinese	Koganei (17)	Soldiers		86.9			6.3	51.8
Do	Shoemaker	Students		79.9				
South Chinese	Weisbach (32)	Prisoners	20–49	85.7				52.6
Do	Crook (2)	Students	20	77.4	81.7			
Do	Whyte (35)					77.1		
Anhwei	Hutcheson (12)					77.7		
Chekiang	do					75.1		
Chihli	do					77.2		

Fukien	do					82.3		
Hunan	do					84		
Hupeh	do					79.5		
Hupeh (Wuchang)	Merrins(23)	Students		83.8				
Kiangsi	Hutcheson(12)					76.2		
Kiangsu	do					76.7		
Kwangtung	Hagen(8)	Sumatra coolies	25–60	83.2			5.2	51.2
Do	Cadbury	Students	20–36	78.9	83	76.5		48
Do	Hutcheson(12)					77		
Kweichow	do					83.3		
Shantung	Janka, quoted by Koganei(17)	Chefu coolies	17–35	84.9				50.6
Do	Hutcheson(12)					80.6		
Szechuan	Wilford(33)	Students	[a]18		79.4	72.9	6.5	

[a] Average.

sion of the thorax averaged 7. In the 1901 group, 7,580 soldiers gave an average of 85.7 centimeters with an excursion average of 7.2. The Koreans' breast measurements are also given by Koganei (see Table 8).

Breton(1) gives the circumference of the chest in 53 men from Hanoi and Haiphong in Tongking as 79.46 centimeters.

Coming now to the Chinese, I have the important studies of Hagen on Chinese coolies in Sumatra, emigrants from Kwangtung Province. He measured the circumference of the chest just above the nipples, halfway between inspiration and expiration, with the arms hanging down. The average circumference was 83.2 centimeters.

Koganei(17) found an average of 86.9 centimeters for North Chinese soldiers, with an average chest excursion of 6.3 centimeters; and, using Hagen's figures for deep expiration and inspiration, he finds an excursion of 5.17 for South Chinese.

Martin(21) gives 49.9 as the percentage of chest circumference to height in Annamites and 52 in the Lolos.

The character of labor counts for much in collecting data of the chest. Students in China are proverbially flat-chested. The largest series of facts is contributed by Hutcheson, but he records only "expiration," a rather less dependable measurement than the circumference while at rest. It is evident, however, that the chest of the Chinese is considerably smaller than that of European peoples.

Measurements taken by me are to be found in Table 6. Since these were taken from students, many of them athletic, it can be concluded that they are better than would be found in the average South Chinese, excluding boatmen and other laborers who constantly use their arms and their chest muscles. More important than the circumference is the excursion, or play, of the chest or the difference in the girth of the thorax, across the nipples, at full inspiration and at full expiration.

Our Cantonese college students of 20 to 23 years of age (see Table 9) have an expansion of 6 centimeters in the majority of cases, and more than half of them average from 6 to 8 centimeters.

By reference to Table 8 it will be noted that the people with the largest chests are the Ainus, in whom the chest is also proportionately greater with reference to height. After these come the Mongolian tribes and the North Chinese. The people of South China, the Koreans, and the Japanese have smaller chests.

TABLE 9.—*Play of chest of Cantonese students.*

Expansion.	Students aged 20.	Students aged 21.	Students aged 22.	Students aged 23.	Students aged 24.	Students aged 25.	Students aged 26.
cm.							
2			1				
3	2	2					
4	6	2	2			1	
5	9	5	1	1	1		
6	16	8	3	1	1		1
7	9	5	3	1			
8	8	1	1	1			
9	1	1	1	1			
10	1	1	1				
11			1				
12							
13	1						
14							
15							
16							
17			1				
Totals	53	25	15	5	2	1	1

Expansion.	Students aged 27.	Students aged 28.	Students aged 29.	Students aged 30.	Students aged 31.	Students aged 36.	Students of all ages.
cm.							
2							1
3							4
4	1		1		1		14
5							17
6					1		31
7						1	19
8							11
9				1			5
10							3
11							1
12							
13							1
14							
15							
16							
17							1
Totals	1		1	1	2	1	108

Generally speaking, people with large chests have greater chest expansion and, where the chest measurement is greater, the height is not correspondingly increased. These chest measurements are not so much a question of race as of occupation and physical development of members of a given race.

CONCLUSIONS

1. The Chinese people average 165 centimeters in height. The people living south of the Yangtze River, in general, are shorter in stature than those north of this river. For Cantonese students of 20 years or over, the average height is 163.6 centimeters.

2. The weight of the Chinese averages 56.9 kilograms in the north and 52.6 kilograms in the south. For Cantonese students of 20 years and over, the average is 51.9 kilograms.

3. Taking the weight-for-height index as a criterion, the index is found to vary from about 313 in the south to 384 in the soldiers of the north. For Cantonese students, it averages 317. These figures are much smaller than the averages for Americans and Europeans.

4. The chest circumference of Chinese is relatively small, varying from 77.4 to 86.9 centimeters. For the students in South China, the average circumference of the chest during rest is 78.9 centimeters, and they have a play of chest of about 6 centimeters.

The South Chinese are therefore inferior to their northern brothers in height, weight, and chest measurements. The Mongolian tribes of the far north and the peoples of Indo-China to the south are inferior in size to the South Chinese. Because of the great tendency of the Cantonese people to travel and their intermarriage with the Malay peoples, it can be assumed that this admixture has had much to do with producing a smaller race of Chinese. On the other hand, it has been my observation that they are capable of developing almost the same degree of muscular energy and physical endurance as are the larger races of mankind.

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[New generic and specific names and new combinations are printed in clarendon; synonyms and names of species incidentally mentioned in the text are printed in *italic*.]

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